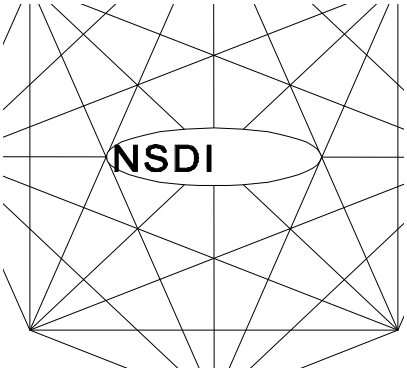

FGDC-STD-001-1998

Content Standard for Digital Geospatial Metadata

Metadata Ad Hoc Working Group
Federal Geographic Data Committee

Federal Geographic Data Committee
Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
National Aeronautics and Space Administration • National Archives and Records Administration
Tennessee Valley Authority

Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups are established for issues that transcend data categories.

For more information about the committee, or to be added to the committee's newsletter mailing list, please contact:

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CONTENTS

Introduction

1. Objectives. The objectives of the standard are to provide a common set of terminology and definitions for the documentation of digital Geospatial data. The standard establishes the names of data elements and compound elements (groups of data elements) to be used for these purposes, the definitions of these compound elements and data elements, and information about the values that are to be provided for the data elements.

The major uses of Metadata are:

- to maintain an organization's internal investment in Geospatial data,
- to provide information about an organization's data holdings to data catalogues, clearinghouses, and brokerages, and
- to provide information needed to process and interpret data to be received through a transfer from an external source.

The information included in the standard was selected based on four roles that Metadata play:

- availability -- data needed to determine the sets of data that exist for a geographic location.
- fitness for use -- data needed to determine if a set of data meets a specific need.
- access -- data needed to acquire an identified set of data.
- transfer -- data needed to process and use a set of data.

These roles form a continuum in which a user cascades through a pyramid of choices to determine what data are available, to evaluate the fitness of the data for use, to access the data, and to transfer and process the data. The exact order in which data elements are evaluated, and the relative importance of data elements, will not be the same for all users.

2. Scope.

This standard is intended to support the collection and processing of Geospatial Metadata. It is intended to be useable by all levels of government and the private sector. The standard is not intended to reflect an implementation design. An implementation design requires adapting the structure and form of the standard to meet application requirements.

The standard was developed from the perspective of defining the information required by a prospective user to determine the availability of a set of Geospatial data; to determine the fitness and the set of Geospatial data for an intended use; to determine the means of accessing the set of Geospatial data; and to successfully transfer the set of Geospatial data. As such, the standard establishes the names of data elements and compound elements to be used for these purposes, definitions of these data elements and compound elements, and information about the values that are to be provided for the data elements. The standard does not specify the means by which this information is organized in a computer system or in a data transfer, nor the means by which this information is transmitted, communicated, or presented to the user.[1]

3. Applicability

[1] The variety of means of organizing data in a computer, the differences among data providers to describe their data holdings because of varying institutional and technical capabilities, the rapid evolution of means to provide information through the Internet for different purposes, and the need to accommodate existing standards have guided the evolution of this decision. The FGDC is pursuing several implementation methods.

This standard is for the documentation of Geospatial data. Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," was signed on April 11, 1994, by President William J. Clinton. Section 3, Development of a National Geospatial Data Clearinghouse, paragraph (b) states: "Standardized Documentation of Data. Beginning nine months from the date of this order, each agency shall document all new Geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC, and make that standardized documentation electronically accessible to the Clearinghouse network. Within one year of the date of this order, agencies shall adopt a schedule, developed in consultation with the FGDC, for documenting, to the extent practicable, Geospatial data previously collected or produced, either directly or indirectly, and making that data documentation electronically accessible to the Clearinghouse network." This standard is the data documentation standard referenced in the executive order.

The FGDC invites and encourages organizations and persons from State, local, and tribal governments, the private sector, and non-profit organizations to use the standard to document their Geospatial data. A major difficulty in the Geospatial data community is the lack of information that helps prospective users to determine what data exist, the fitness of existing data for planned applications, and the conditions for accessing existing data, and to transfer data to a user's system. This standard, developed with aid of broad public participation, will help to ease these problems and to develop the National Spatial Data Infrastructure.

4. Related Standards

The Spatial Data Transfer Standard (SDTS) was developed to allow the transfer of digital spatial data sets between spatial data software. The Content Standard for Digital Geospatial Metadata was developed to identify and define the Metadata elements used to document digital Geospatial data sets for many purposes. These include Metadata to: 1) preserve the meaning and value of a data set; 2) contribute to a catalog or clearinghouse and; 3) aid in data transfer. Since the SDTS is a standard for data transfer, its primary Metadata content is used to determine the fitness of the data set for the user's purpose. There is a close relationship between the Metadata Standard and the SDTS Metadata elements contained in the Data Quality module, and in other locations inside of the SDTS transfer set. Since the Metadata Standard contains Metadata used to search for digital spatial data sets through a clearinghouse (Metadata for locating, describing access, use, and distribution), these elements may not be contained in the SDTS transfer set.

The Content Standard for Digital Geospatial Metadata uses to the maximum extent possible, existing International or National Standards, as documented in Office of Management and Budget Circular A-119 "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity assessment Activities." American National Standards referenced in the Content Standard for Digital Geospatial Metadata include the American National Standards Institute, 1975, Representations of universal time, local time differentials, and United States time zone reference for information interchange (ANSI X3.51-1975): New York, American National Standards Institute; American National Standards Institute, 1986, Representation for calendar date and ordinal date for information interchange (ANSI X3.30-1985): New York, American National Standards Institute; American National Standards Institute, 1986, Representations of local time of day for information interchange (ANSI X3.43-1986): New York, American National Standards Institute.

The June 8, 1994 FGDC Metadata Standard was used as the base document for International Organization for Standardization (ISO) 15046 Part 15. The draft ISO Metadata Standard 15046 Part 15 has had a number of changes made to it. At this time this revision was prepared, the ISO Metadata Standard was still in Committee Draft form and subject to significant change before final approval, therefore, is not identical to the current ISO draft but is thought to be consistent with it.

5. Standards Development Process

The Federal Geographic Data Committee (FGDC) initiated work on the first version of the standard in

June, 1992, through a forum on Geospatial Metadata. At the forum, the participants agreed on the need for a standard on the information content of Metadata about Geospatial data. The committee accepted the offer of ASTM[2] Section D18.01.05 to develop a draft information content standard. The draft was slightly revised, and offered for public review from October 1992 to April 1993. Extensive comments were received from the public. The FGDC Standards Working Group revised the draft. The revised draft was provided for further review and testing in July 1993. Refined drafts were offered for review and testing in January and March 1994. The first version was approved June 8, 1994.

Since the FGDC Metadata Standard was adopted, it has been implemented by numerous Federal, state, and local agencies, companies, and groups. It has also been used by other nations as they develop their own national Metadata standards. Proposed changes to the Metadata Standard have been suggested during the time since it was issued. Further, an implementor's workshop was held specifically to discuss strengths, weaknesses, and proposed improvements. Drawing on this body of knowledge, the FGDC proposed to modify the current Metadata Standard.

The June 1998 version is fully backward compatible with and supersedes the June 8, 1994 version. The June 1998 version provides for the definition of Profiles (Appendix E) and extensibility through User Defined Metadata Extensions (Appendix D). The June 1998 version also modifies some production rules to ease implementation.

6. Maintenance Authority. The current maintenance authority for the standard is the FGDC Secretariat. The Federal Geographic Data Committee is the approving authority for the standard. Questions concerning the standard are to be addressed to the FGDC Secretariat, in care of the U.S. Geological Survey, 590 National Center, Reston, Virginia 20192. Copies of this publication are available from the Federal Geographic Data Committee. Secretariat, in care of the U.S. Geological Survey, 590 National Center, Reston, Virginia 20192; telephone (703) 648-5514; facsimile (703) 648-5755; Internet (electronic mail) gdc@usgs.gov. The text also is available from anonymous File Transfer Protocol (anonymous ftp) server fgdc.er.usgs.gov and at the FGDC web site http://www.fgdc.gov/metadata.

[2] formally the American Society for Testing and Materials

Organization of the Standard

Numbered Sections

The standard is organized in a hierarchy of data elements and compound elements that define the information content for metadata to document a set of digital geospatial data. The starting point is "metadata" (section 0). The compound element "metadata" is composed of other compound elements representing different concepts about the data set. Each of these compound elements has a numbered section in the standard. In each numbered section, these compound elements are defined by other compound elements and data elements. The section "contact information" is a special section that specifies the data elements for contacting individuals and organizations. This section is used by other sections, and is defined once for convenience.

Each section begins with the name and definition of the compound element that defines the section. The name and definition are followed by production rules (see below) that define this compound element in terms of data elements, either directly or by the use of intermediate compound elements. When intermediate compound elements are used, the production rules for these elements also are provided in this part of the section.

Additional information about the organization of the Standard follows:

- The production rules are followed by a list of names and definitions of compound elements and data elements used in the section.

- Section and element numbers are provided for user navigation of the standard. They are neither authoritative nor intended for use in implementation and are subject to change in future revisions of the standard.

Compound Elements

A compound element is a group of data elements and other compound elements. All compound elements are described by data elements, either directly or through intermediate compound elements. Compound elements represent higher-level concepts that cannot be represented by individual data elements. The form for the definition of compound elements is:

> Compound element name -- definition.
> Type: compound
> Short Name:

The type of "compound" uniquely identifies the compound elements in the lists of terms and definitions.

Short names consisting of eight alphabetic characters or less are included to assist in implementation of the standard.

Data Elements

A data element is a logically primitive item of data. The entry for a data element includes the name of the data element, the definition of the data element, a description of the values that can be assigned to the data element, and a short name for the data element. The form for the definition of the data elements is:

> Data element name -- definition.
> Type:
> Domain:

Short Name:

The information about the values for the data elements include a description of the type of the value, and a description of the domain of the valid values. The type of the data element describes the kind of value to be provided. The choices are "integer" for integer numbers, "real" for real numbers, "text" for ASCII characters, "date" for day of the year, and "time" for time of the day.

The domain describes valid values that can be assigned to the data element. The domain may specify a list of valid values, references to lists of valid values, or restrictions on the range of values that can be assigned to a data element.

The domain also may note that the domain is free from restrictions, and any values that can be represented by the "type" of the data element can be assigned. These unrestricted domains are represented by the use of the word "free" followed by the type of the data element (that is, free text, free date, free real, free time, free integer). Some domains can be partly, but not completely, specified. For example, there are several widely used data transfer formats, but there may be many more that are less well known. To allow a producer to describe its data in these circumstances, the convention of providing a list of values followed by the designation of a "free" domain was used. In these cases, assignments of values shall be made from the provided domain when possible. When not possible, providers may create and assign their own value. A created value shall not redefine a value provided by the standard.

Short names consisting of eight alphabetic characters or less are included to assist in user implementation of the standard.

Another issue is the representation of null values (representing such concepts as "unknown") in the domain. While this is relatively simple for textual entries (one would enter the text "Unknown"), it is not as simple for the integer, real, date, and time types. (For example, which integer value means "unknown"?). Because conventions for providing this information vary among implementations, the standard specifies what concepts shall be represented, but does not mandate a means for representing them.

In addition to the values to be represented, the form of representation also is important, especially to applications that will manipulate the data elements. The following conventions for forms of values for data elements shall be used:

Calendar Dates (Years, Months, and Days)

- A.D. Era to December 31, 9999 A.D. -- Values for day and month of year, and for years, shall follow the calendar date convention (general forms of YYYY for years; YYYYMM for month of a year (with month being expressed as an integer), and YYYYMMDD for a day of the year) specified in American National Standards Institute, 1986, Representation for calendar date and ordinal date for information interchange (ANSI X3.30-1985): New York, American National Standards Institute (adopted as Federal Information Processing Standard 4-1).

- B.C. Era to 9999 B.C. -- Values for day and month of year, and for years, shall follow the calendar date convention, preceded by the lower case letters "bc" (general forms of bcYYYY for years; bcYYYYMM for month of a year (with month being expressed as an integer), and bcYYYYMMDD for a day of the year).

- B.C. Era before 9999 B.C. -- Values for the year shall consist of as many numeric characters as needed to represent the number of the year B.C., preceded by lower case letters "cc" (general form of ccYYYYYYY...).

- A.D. Era after 9999 A.D. -- Values for the year shall consist of as many numeric characters as needed to represent number of the year A.D., preceded by the lower case letters "cd" (general form of cdYYYYYYY...).

Time of Day (Hours, Minutes, and Seconds)

- Because some geospatial data and related applications are sensitive to time of day information, three conventions are permitted. Only one convention shall be used for metadata for a data set. The conventions are:

  - Local Time. For producers who wish to record time in local time, values shall follow the 24-hour timekeeping system for local time of day in the hours, minutes, seconds, and decimal fractions of a second (to the precision desired) without separators convention (general form of HHMMSSSS) specified in American National Standards Institute, 1986, Representations of local time of day for information interchange (ANSI X3.43-1986): New York, American National Standards Institute.

  - Local Time with Time Differential Factor. For producers who wish to record time in local time and the relationship to Universal Time (Greenwich Mean Time), values shall follow the 24-hour timekeeping system for local time of day in hours, minutes, seconds, and decimal fractions of a second (to the resolution desired) without separators convention. This value shall be followed, without separators, by the time differential factor. The time differential factor expresses the difference in hours and minutes between local time and Universal Time. It is represented by a four-digit number preceded by a plus sign (+) or minus sign (-), indicating hours and minutes local time is ahead of or behind Universal Time, respectively. The general form is HHMMSSSSshhmm, where HHMMSSSS is the local time using 24-hour timekeeping (expressed to the precision desired), 's' is the plus or minus sign for the time differential factor, and hhmm is the time differential factor. (This option allows producers to record local time and time zone information. For example, Eastern Standard Time has a time differential factor of -0500, Central Standard Time has a time differential factor of -0600, Eastern Daylight Time has a time differential factor of -0400, and Central Daylight Time has a time differential factor of -0500.) This option is specified in American National Standards Institute, 1975, Representations of universal time, local time differentials, and United States time zone reference for information interchange (ANSI X3.51-1975): New York, American National Standards Institute.

  - Universal Time (Greenwich Mean Time). For producers who wish to record time in Universal Time (Greenwich Mean Time), values shall follow the 24-hour timekeeping system for Universal Time of day in hours, minutes, seconds, and decimal fractions of a second (expressed to the precision desired) without separators convention, with the upper case letter "Z" directly following the low-order (or extreme right hand) time element of the 24-hour clock time expression. The general form is HHMMSSSSZ, where HHMMSSSS is Universal Time using 24-hour timekeeping, and Z is the letter "Z". This option is specified in American National Standards Institute, 1975, Representations of universal time, local time differentials, and United States time zone reference for information interchange (ANSI X3.51-1975): New York, American National Standards Institute.

Latitude and Longitude

- Values for latitude and longitude shall be expressed as decimal fractions of degrees. Whole degrees of latitude shall be represented by a two-digit decimal number ranging from 0 through 90. Whole degrees of longitude shall be represented by a three-digit decimal number ranging from 0 through

180. When a decimal fraction of a degree is specified, it shall be separated from the whole number of degrees by a decimal point. Decimal fractions of a degree may be expressed to the precision desired.

- Latitudes north of the equator shall be specified by a plus sign (+), or by the absence of a minus sign (-), preceding the two digits designating degrees. Latitudes south of the Equator shall be designated by a minus sign (-) preceding the two digits designating degrees. A point on the Equator shall be assigned to the Northern Hemisphere.

- Longitudes east of the prime meridian shall be specified by a plus sign (+), or by the absence of a minus sign (-), preceding the three digits designating degrees of longitude. Longitudes west of the meridian shall be designated by minus sign (-) preceding the three digits designating degrees. A point on the prime meridian shall be assigned to the Eastern Hemisphere. A point on the 180th meridian shall be assigned to the Western Hemisphere. One exception to this last convention is permitted. For the special condition of describing a band of latitude around the earth, the East Bounding Coordinate data element shall be assigned the value +180 (180) degrees.

- Any spatial address with a latitude of +90 (90) or -90 degrees will specify the position at the North or South Pole, respectively. The component for longitude may have any legal value.

With the exception of the special condition described above, this form is specified in American National Standards Institute, 1986, Representations of Geographic Point Locations for Information Interchange (ANSI X3.61-1986): New York, American National Standards Institute.

Network Addresses and File Names

Values for file names, network addresses for computer systems, and related services should follow the Uniform Resource Locator convention of the Internet when possible. See http://www.ncsa.uiuc.edu/demoweb/url-primer.html for additional details about the Uniform Resource Locator.

Optionality

The standard categorizes elements as being mandatory, mandatory-if-applicable, or optional as follows:

- Mandatory elements must be provided.
- Mandatory-if-applicable elements must be provided if the data set exhibits the defined characteristic.
- Optional elements are provided at the discretion of the metadata producer.

The optionality of a section or compound element always takes precedence over the elements that it contains. Once a section or compound element is recognized by the data set producer as applicable, then the optionality of its subordinate elements is to be interpreted. See Production Rules section for additional interpretive guidance.

Mandatory sections in the standard have some elements that are always required for all types of geospatial data sets. For comparison with other metadata standards, these elements are referred to as “core” elements.

Production Rules

A production rule specifies the relationship between a compound element, and data elements and other (lower-level) compound elements. Each production rule has a left side (identifier) and a right side

(expression) connected by the symbol "=", meaning that the term on the left side is replaced by or produces the term on the right side. Terms on the right side are either other compound elements or individual data elements. By making substitutions using matching terms in the production rules, one can explain higher-level concepts using data elements. The symbols used in the production rules have the following meaning:

Symbol Meaning

=	is replaced by, produces, consists of
+	and
[|]	selection - select one term from the list of enclosed terms (exclusive or). Terms are separated by "|"
m{}n	iteration - the term(s) enclosed is(are) repeated from "m" to "n" times
()	optional - the term(s) enclosed is(are) optional

Examples:

a = b + c "a consists of b and c"
a = [b | c "a consists of one of b or c"

a = 4{b}6 "a consists of four to six occurrences of b"

a = b + (c) "a consists of b and optionally c"

Interpreting the production rules:

The terms bounded by parentheses, "(" and ")", are optional and are provided at the discretion of the data producer. If a producer chooses to provide information enclosed by parentheses, the producer shall follow the production rules for the enclosed information. For example, if the producer decides to provide the optional information described in the term:

(a + b + c)

the producer shall provide a and b and c.

Only for terms bounded by parentheses does the producer have the discretion of deciding whether or not to provide the information.

The variation among the ways in which geospatial data are produced and distributed, the fact that all geospatial data does not have the same characteristics, and the issue that all details of data sets that are in work or are planned may not be decided, caused the need to express the concept of "mandatory if applicable." This concept means that if the data set exhibits (or, for data sets that are in work or planned, it is known that the data set will exhibit) a defined characteristic, then the producer shall provide the information needed to describe that characteristic. This concept is described by the production rule:

0{ term }1

Extensibility

Extended elements may be defined by a data set producer or a user community. Extended elements are elements outside the standard, but needed by the data set producer. If extended elements are created, they must follow the guidelines in Appendix D, Guidelines for creating extended elements

to the Content Standard for Digital Geospatial Metadata.

Metadata

0 Metadata -- data about the content, quality, condition, and other characteristics of data.
Type: compound
Short Name: metadata

Metadata =
Identification_Information +
0{Data_Quality_Information}1 +
0{Spatial_Data_Organization_Information}1 +
0{Spatial_Reference_Information}1 +
0{Entity_and_Attribute_Information}1 +
0{Distribution_Information}n +
Metadata_Reference_Information

(Sections 1 through 7 define the terms on the right side of the production rule.)

Identification Information

1 Identification Information -- basic information about the data set.
Type: compound
Short Name: idinfo

Identification_Information =
Citation +
Description +
Time_Period_of_Content +
Status +
Spatial_Domain +
Keywords +
Access_Constraints +
Use_Constraints +
(Point_of_Contact) +
(1{Browse_Graphic}n) +
(Data_Set_Credit) +
(Security_Information) +
(Native_Data_Set_Environment) +
(1{Cross_Reference}n)

Citation =
Citation_Information *(see section 8 for production rules)*

Description =
Abstract +
Purpose +
(Supplemental_Information)

Time_Period_of_Content =
Time_Period_Information *(see section 9 for production rules)* +
Currentness_Reference

Status =
Progress +
Maintenance_and_Update_Frequency

Spatial_Domain =
Bounding_Coordinates +
(1{Data_Set_G-Polygon}n)

Bounding_Coordinates =
West_Bounding_Coordinate +
East_Bounding_Coordinate +
North_Bounding_Coordinate +
South_Bounding_Coordinate

Data_Set_G-Polygon =
Data_Set_G-Polygon_Outer_G-Ring +
0{Data_Set_G-Polygon_Exclusion_G-Ring}n

Data_Set_G-Polygon_Outer_G-Ring =

[4{G-Ring_Point}n | G-Ring]

Data_Set_G-Polygon_Exclusion_G-Ring =
[4{G-Ring_Point}n | G-Ring]

G-Ring_Point =
G-Ring_Latitude +
G-Ring_Longitude

Keywords =
1{Theme}n +
0{Place}n +
0{Stratum}n +
0{Temporal}n

Theme =
Theme_Keyword_Thesaurus +
1{Theme_Keyword}n

Place =
Place_Keyword_Thesaurus +
1{Place_Keyword}n

Stratum =
Stratum_Keyword_Thesaurus +
1{Stratum_Keyword}n

Temporal =
Temporal_Keyword_Thesaurus +
1{Temporal_Keyword}n

Point_of_Contact =
Contact_Information *(see section 10 for production rules)*

Browse_Graphic =
Browse_Graphic_File_Name +
Browse_Graphic_File_Description +
Browse_Graphic_File_Type

Security_Information =
Security_Classification_System +
Security_Classification +
Security_Handling_Description

Cross_Reference =
Citation_Information *(see section 8 for production rules)*

1.1 Citation -- information to be used to reference the data set.
Type: compound
Short Name: citation

1.2 Description -- a characterization of the data set, including its intended use and limitations.
Type: compound

Short Name: descript

1.2.1 Abstract -- a brief narrative summary of the data set.
Type: text
Domain: free text
Short Name: abstract

1.2.2 Purpose -- a summary of the intentions with which the data set was developed.
Type: text
Domain: free text
Short Name: purpose

1.2.3 Supplemental Information -- other descriptive information about the data set.
Type: text
Domain: free text
Short Name: supplinf

1.3 Time Period of Content -- time period(s) for which the data set corresponds to the currentness reference.
Type: compound
Short Name: timeperd

1.3.1 Currentness Reference -- the basis on which the time period of content information is determined.
Type: text
Domain: "ground condition" "publication date" free text
Short Name: current

1.4 Status -- the state of and maintenance information for the data set.
Type: compound
Short Name: status

1.4.1 Progress -- the state of the data set.
Type: text
Domain: "Complete" "In work" "Planned"
Short Name: progress

1.4.2 Maintenance and Update Frequency -- the frequency with which changes and additions are made to the data set after the initial data set is completed.
Type: text
Domain: "Continually" "Daily" "Weekly" "Monthly" "Annually" "Unknown" "As needed" "Irregular" "None planned" free text
Short Name: update

1.5 Spatial Domain - the geographic areal domain of the data set.
Type: compound
Short Name: spdom

1.5.1 Bounding Coordinates - the limits of coverage of a data set expressed by latitude and longitude values in the order western-most, eastern-most, northern-most, and southern-most. For data sets that include a complete band of latitude around the earth, the West Bounding Coordinate shall be assigned the value -180.0, and the East Bounding Coordinate shall be assigned the value 180.0

Type: compound
Short Name: bounding

1.5.1.1 West Bounding Coordinate -- western-most coordinate of the limit of coverage expressed in longitude.
Type: real
Domain: -180.0 <= West Bounding Coordinate < 180.0
Short Name: westbc

1.5.1.2 East Bounding Coordinate -- eastern-most coordinate of the limit of coverage expressed in longitude.
Type: real
Domain: -180.0 <= East Bounding Coordinate <= 180.0
Short Name: eastbc

1.5.1.3 North Bounding Coordinate -- northern-most coordinate of the limit of coverage expressed in latitude.
Type: real
Domain: -90.0 <= North Bounding Coordinate <= 90.0;
North Bounding Coordinate >= South Bounding Coordinate
Short Name: northbc

1.5.1.4 South Bounding Coordinate -- southern-most coordinate of the limit of coverage expressed in latitude.
Type: real
Domain: -90.0 <= South Bounding Coordinate <= 90.0;
South Bounding Coordinate <= North Bounding Coordinate
Short Name: southbc

1.5.2 Data Set G-Polygon -- coordinates defining the outline of an area covered by a data set.
Type: compound
Short Name: dsgpoly

1.5.2.1 Data Set G-Polygon Outer G-Ring -- the closed nonintersecting boundary of an interior area.
Type: compound
Short Name: dsgpolyo

1.5.2.1.1 G-Ring Point -- a single geographic location.
Type: compound
Short Name: grngpoin

1.5.2.1.1.1 G-Ring Latitude -- the latitude of a point of the g-ring.
Type: real
Domain: -90.0 <= G-Ring Latitude <= 90.0
Short Name: gringlat

1.5.2.1.1.2 G-Ring Longitude -- the longitude of a point of the g-ring.
Type: real
Domain: -180.0 <= G-Ring Longitude < 180.0
Short Name: gringlon

1.5.2.1.2 G-Ring -- a set of ordered pairs of floating-point numbers, separated by commas, in which the first number in each pair is the longitude of a point and

the second is the latitude of the point. Longitude and latitude are specified in decimal degrees with north latitudes positive and south negative, east longitude positive and west negative

Type: text
Domain: -90<= Latitude_elements <= 90,
-180 <= Longitude_Elements = 180
Short Name: gring

1.5.2.2 Data Set G-Polygon Exclusion G-Ring -- the closed nonintersecting boundary of a void area (or "hole" in an interior area).

Type: compound
Short Name: dsgpolyx

1.6 Keywords -- words or phrases summarizing an aspect of the data set.

Type: compound
Short Name: keywords

1.6.1 Theme -- subjects covered by the data set (for a list of some commonly-used thesauri, see Part IV: Subject/index term sources *in* Network Development and MARC Standards Office, 1988, USMARC code list for relators, sources, and description conventions: Washington, Library of Congress).

Type: compound
Short Name: theme

1.6.1.1 Theme Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of theme keywords.

Type: text
Domain: "None" free text
Short Name: themekt

1.6.1.2 Theme Keyword -- common-use word or phrase used to describe the subject of the data set.

Type: text
Domain: free text
Short Name: themekey

1.6.2 Place -- geographic locations characterized by the data set.

Type: compound
Short Name: place

1.6.2.1 Place Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of place keywords.

Type: text
Domain: "None" "Geographic Names Information System" free text
Short Name: placekt

1.6.2.2 Place Keyword -- the geographic name of a location covered by a data set.

Type: text
Domain: free text
Short Name: placekey

1.6.3 Stratum -- layered, vertical locations characterized by the data set.

Type: compound

Short Name: stratum

1.6.3.1 Stratum Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of stratum keywords.
Type: text
Domain: "None" free text
Short Name: stratkt

1.6.3.2 Stratum Keyword -- the name of a vertical location used to describe the locations covered by a data set.
Type: text
Domain: free text
Short Name: stratkey

1.6.4 Temporal -- time period(s) characterized by the data set.
Type: compound
Short Name: temporal

1.6.4.1 Temporal Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of temporal keywords.
Type: text
Domain: "None" free text
Short Name: tempkt

1.6.4.2 Temporal Keyword -- the name of a time period covered by a data set.
Type: text
Domain: free text
Short Name: tempkey

1.7 Access Constraints -- restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the data set.
Type: text
Domain: "None" free text
Short Name: accconst

1.8 Use Constraints -- restrictions and legal prerequisites for using the data set after access is granted. These include any use constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the data set.
Type: text
Domain: "None" free text
Short Name: useconst

1.9 Point of Contact -- contact information for an individual or organization that is knowledgeable about the data set.
Type: compound
Short Name: ptcontac

1.10 Browse Graphic -- a graphic that provides an illustration of the data set. The graphic should include a legend for interpreting the graphic.
Type: compound
Short Name: browse

1.10.1 Browse Graphic File Name -- name of a related graphic file that provides an illustration of the data

set.
Type: text
Domain: free text
Short Name: browsen

1.10.2 Browse Graphic File Description -- a text description of the illustration.
Type: text
Domain: free text
Short Name: browsed

1.10.3 Browse Graphic File Type -- graphic file type of a related graphic file.
Type: text
Domain: domain values in the table below; free text
Short Name: browset

Domain Value	Definition
"CGM"	Computer Graphics Metafile
"EPS"	Encapsulated Postscript format
"EMF"	Enhanced Metafile
"GIF"	Graphic Interchange Format
"JPEG"	Joint Photographic Experts Group format
"PBM"	Portable Bit Map format
"PS"	Postscript format
"TIFF"	Tagged Image File Format
"WMF"	Windows metafile
"XWD"	X-Windows Dump

1.11 Data Set Credit -- recognition of those who contributed to the data set.
Type: text
Domain: free text
Short Name: datacred

1.12 Security Information -- handling restrictions imposed on the data set because of national security, privacy, or other concerns.
Type: compound
Short Name: secinfo

1.12.1 Security Classification System -- name of the classification system.
Type: text
Domain: free text
Short Name: secsys

1.12.2 Security Classification -- name of the handling restrictions on the data set.
Type: text
Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified" "Sensitive" free text
Short Name: secclass

1.12.3 Security Handling Description -- additional information about the restrictions on handling the data set.
Type: text
Domain: free text
Short Name: sechandl

1.13 Native Data Set Environment -- a description of the data set in the producer's processing environment, including items such as the name of the software (including version), the computer operating system, file name (including host-, path-, and filenames), and the data set size.
Type: text
Domain: free text
Short Name: native

1.14 Cross Reference -- information about other, related data sets that are likely to be of interest.
Type: compound
Short Name: crossref

Data Quality Information

2 Data Quality Information -- a general assessment of the quality of the data set. (Recommendations on information to be reported and tests to be performed are found in "Spatial Data Quality," which is chapter 3 of part 1 in Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology.)

Type: compound
Short Name: dataqual

Data_Quality_Information =
0{Attribute_Accuracy}1 +
Logical_Consistency_Report +
Completeness_Report +
0{Positional_Accuracy}1 +
Lineage +
(Cloud_Cover)

Attribute_Accuracy =
Attribute_Accuracy_Report +
(1{Quantitative_Attribute_Accuracy_Assessment}n)

Quantitative_Attribute_Accuracy_Assessment =
Attribute_Accuracy_Value +
Attribute_Accuracy_Explanation

Positional_Accuracy =
0{Horizontal_Positional_Accuracy}1 +
0{Vertical_Positional_Accuracy}1

Horizontal_Positional_Accuracy =
Horizontal_Positional_Accuracy_Report +
(1{Quantitative_Horizontal_Positional_Accuracy_Assessment}n)

Quantitative_Horizontal_Positional_Accuracy_Assessment =
Horizontal_Positional_Accuracy_Value +
Horizontal_Positional_Accuracy_Explanation

Vertical_Positional_Accuracy =
Vertical_Positional_Accuracy_Report +
(1{Quantitative_Vertical_Positional_Accuracy_Assessment}n)

Quantitative_Vertical_Positional_Accuracy_Assessment =
Vertical_Positional_Accuracy_Value +
Vertical_Positional_Accuracy_Explanation

Lineage =
0{Source_Information}n +
1{Process_Step}n
Source_Information =
Source_Citation +
0{Source_Scale_Denominator}1 +
Type_of_Source_Media +

Source_Time_Period_of_Content +
Source_Citation_Abbreviation +
Source_Contribution

Source_Citation =
Citation_Information *(see section 8 for production rules)*

Source_Time_Period_of_Content =
Time_Period_Information *(see section 9 for production rules)* +
Source_Currentness_Reference

Process_Step =
Process_Description +
0{Source_Used_Citation_Abbreviation}n +
Process_Date +
(Process_Time) +
0{Source_Produced_Citation_Abbreviation}n +
(Process_Contact)

Process_Contact =
Contact_Information *(see section 10 for production rules)*

2.1 Attribute Accuracy -- an assessment of the accuracy of the identification of entities and assignment of attribute values in the data set.
Type: compound
Short Name: attracc

2.1.1 Attribute Accuracy Report -- an explanation of the accuracy of the identification of the entities and assignments of values in the data set and a description of the tests used.
Type: text
Domain: free text
Short Name: attraccr

2.1.2 Quantitative Attribute Accuracy Assessment -- a value assigned to summarize the accuracy of the identification of the entities and assignments of values in the data set and the identification of the test that yielded the value.
Type: compound
Short Name: qattracc

2.1.2.1 Attribute Accuracy Value -- an estimate of the accuracy of the identification of the entities and assignments of attribute values in the data set.
Type: text
Domain: "Unknown" free text
Short Name: attraccv

2.1.2.2 Attribute Accuracy Explanation -- the identification of the test that yielded the Attribute Accuracy Value.
Type: text
Domain: free text
Short Name: attracce

2.2 Logical Consistency Report -- an explanation of the fidelity of relationships in the data set and tests used.

Type: text
Domain: free text
Short Name: logic

2.3 Completeness Report -- information about omissions, selection criteria, generalization, definitions used, and other rules used to derive the data set.
Type: text
Domain: free text
Short Name: complete

2.4 Positional Accuracy -- an assessment of the accuracy of the positions of spatial objects.
Type: compound
Short Name: posacc

2.4.1 Horizontal Positional Accuracy -- an estimate of accuracy of the horizontal positions of the spatial objects.
Type: compound
Short Name: horizpa

2.4.1.1 Horizontal Positional Accuracy Report -- an explanation of the accuracy of the horizontal coordinate measurements and a description of the tests used.
Type: text
Domain: free text
Short Name: horizpar

2.4.1.2 Quantitative Horizontal Positional Accuracy Assessment -- numeric value assigned to summarize the accuracy of the horizontal coordinate measurements and the identification of the test that yielded the value.
Type: compound
Short Name: qhorizpa

2.4.1.2.1 Horizontal Positional Accuracy Value -- an estimate of the accuracy of the horizontal coordinate measurements in the data set expressed in (ground) meters.
Type: real
Domain: free real
Short Name: horizpav

2.4.1.2.2 Horizontal Positional Accuracy Explanation -- the identification of the test that yielded the Horizontal Positional Accuracy Value.
Type: text
Domain: free text
Short Name: horizpae

2.4.2 Vertical Positional Accuracy -- an estimate of accuracy of the vertical positions in the data set.
Type: compound
Short Name: vertacc

2.4.2.1 Vertical Positional Accuracy Report -- an explanation of the accuracy of the vertical coordinate measurements and a description of the tests used.
Type: text
Domain: free text

Short Name: vertaccr

2.4.2.2 Quantitative Vertical Positional Accuracy Assessment -- numeric value assigned to summarize the accuracy of vertical coordinate measurements and the identification of the test that yielded the value.
Type: compound
Short Name: qvertpa

2.4.2.2.1 Vertical Positional Accuracy Value -- an estimate of the accuracy of the vertical coordinate measurements in the data set expressed in (ground) meters.
Type: real
Domain: free real
Short Name: vertaccv

2.4.2.2.2 Vertical Positional Accuracy Explanation -- the identification of the test that yielded the Vertical Positional Accuracy Value.
Type: text
Domain: free text
Short Name: vertacce

2.5 Lineage -- information about the events, parameters, and source data which constructed the data set, and information about the responsible parties.
Type: compound
Short Name: lineage

2.5.1 Source Information -- list of sources and a short discussion of the information contributed by each.
Type: compound
Short Name: srcinfo

2.5.1.1 Source Citation -- reference for a source data set.
Type: compound
Short Name: srccite

2.5.1.2 Source Scale Denominator -- the denominator of the representative fraction on a map (for example, on a 1:24,000-scale map, the Source Scale Denominator is 24000).
Type: integer
Domain: Source Scale Denominator > 1
Short Name: srcscale

2.5.1.3 Type of Source Media -- the medium of the source data set.
Type: text
Domain: "paper" "stable-base material" "microfiche" "microfilm" "audiocassette" "chart" "filmstrip" "transparency" "videocassette" "videodisc" "videotape" "physical model" "computer program" "disc" "cartridge tape" "magnetic tape" "online" "CD-ROM" "electronic bulletin board" "electronic mail system" free text
Short Name: typesrc

2.5.1.4 Source Time Period of Content -- time period(s) for which the source data set corresponds to the ground.
Type: compound
Short Name: srctime

2.5.1.4.1 Source Currentness Reference -- the basis on which the source time period of content information of the source data set is determined.
Type: text
Domain: "ground condition" "publication date" free text
Short Name: srccurr

2.5.1.5 Source Citation Abbreviation -- short-form alias for the source citation.
Type: text
Domain: free text
Short Name: srccitea

2.5.1.6 Source Contribution -- brief statement identifying the information contributed by the source to the data set.
Type: text
Domain: free text
Short Name: srccontr

2.5.2 Process Step -- information about a single event.
Type: compound
Short Name: procstep

2.5.2.1 Process Description -- an explanation of the event and related parameters or tolerances.
Type: text
Domain: free text
Short Name: procdesc

2.5.2.2 Source Used Citation Abbreviation -- the Source Citation Abbreviation of a data set used in the processing step.
Type: text
Domain: Source Citation Abbreviations from the Source Information entries for the data set.
Short Name: srcused

2.5.2.3 Process Date -- the date when the event was completed.
Type: date
Domain: "Unknown" "Not complete" free date
Short Name: procdate

2.5.2.4 Process Time -- the time when the event was completed.
Type: time
Domain: free time
Short Name: proctime

2.5.2.5 Source Produced Citation Abbreviation -- the Source Citation Abbreviation of an intermediate data set that (1) is significant in the opinion of the data producer, (2) is generated in the processing step, and (3) is used in later processing steps.
Type: text
Domain: Source Citation Abbreviations from the Source Information entries for the data set.
Short Name: srcprod

2.5.2.6 Process Contact -- the party responsible for the processing step information.

Type: compound
Short Name: proccont

2.6 Cloud Cover -- area of a data set obstructed by clouds, expressed as a percentage of the spatial extent.

Type: integer
Domain: 0 <= Cloud Cover <= 100 "Unknown"
Short Name: cloud

Spatial Data Organization Information

3 Spatial Data Organization Information -- the mechanism used to represent spatial information in the data set.
Type: compound
Short Name: spdoinfo

Spatial_Data_Organization_Information =
0{Indirect_Spatial_Reference}1 +
0{Direct_Spatial_Reference_Method +
([Point_and_Vector_Object_Information |
Raster_Object_Information])}1

Point_and_Vector_Object_Information =
[1{SDTS_Terms_Description}n |
VPF_Terms_Description]

SDTS_Terms_Description =
SDTS_Point_and_Vector_Object_Type +
(Point_and_Vector_Object_Count)

VPF_Terms_Description =
VPF_Topology_Level +
1{VPF_Point_and_Vector_Object_Information}n

VPF_Point_and_Vector_Object_Information =
VPF_Point_and_Vector_Object_Type +
(Point_and_Vector_Object_Count)

Raster_Object_Information =
Raster_Object_Type +
(Row_Count +
Column_Count +
0{Vertical_Count}1)

3.1 Indirect Spatial Reference -- name of types of geographic features, addressing schemes, or other means through which locations are referenced in the data set.
Type: text
Domain: free text
Short Name: indspref

3.2 Direct Spatial Reference Method -- the system of objects used to represent space in the data set.
Type: text
Domain: "Point" "Vector" "Raster"
Short Name: direct

3.3 Point and Vector Object Information -- the types and numbers of vector or nongridded point spatial objects in the data set.
Type: compound
Short Name: ptvctinf

3.3.1 SDTS Terms Description -- point and vector object information using the terminology and concepts from "Spatial Data Concepts," which is Chapter 2 of Part 1 *in* Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing

Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology. *(Note that this reference to the SDTS is used ONLY to provide a set of terminology for the point and vector objects.)*

Type: compound
Short Name: sdtsterm

3.3.1.1 SDTS Point and Vector Object Type -- name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the data set.

Type: text
Domain: (The domain is from "Spatial Data Concepts," which is Chapter 2 of Part 1 *in* Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology):

"Point" "Entity point" "Label point" "Area point" "Node, planar graph" "Node, network" "String" "Link" "Complete chain" "Area chain" "Network chain, planar graph" "Network chain, nonplanar graph" "Circular arc, three point center" "Elliptical arc" "Uniform B-spline" "Piecewise Bezier" "Ring with mixed composition" "Ring composed of strings" "Ring composed of chains" "Ring composed of arcs" "G-polygon" "GT-polygon composed of rings" "GT-polygon composed of chains" "Universe polygon composed of rings" "Universe polygon composed of chains" "Void polygon composed of rings" "Void polygon composed of chains"

Short Name: sdtstype

3.3.1.2 Point and Vector Object Count -- the total number of the point or vector object type occurring in the data set.

Type: integer
Domain: Point and Vector Object Count > 0
Short Name: ptvctcnt

3.3.2 VPF Terms Description -- point and vector object information using the terminology and concepts from Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office. *(Note that this reference to the VPF is used ONLY to provide a set of terminology for the point and vector objects.)*

Type: compound
Short Name: vpfterm

3.3.2.1 VPF Topology Level -- the completeness of the topology carried by the data set. The levels of completeness are defined in Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office.

Type: integer
Domain: 0 <= VPF Topology Level <= 3
Short Name: vpflevel

3.3.2.2 VPF Point and Vector Object Information -- information about VPF point and vector objects

Type: compound
Short Name: vpfinfo

3.3.2.2.1 VPF Point and Vector Object Type -- name of point and vector spatial objects

used to locate zero-, one-, and two-dimensional spatial locations in the data set.
Type: text
Domain: (The domain is from Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office):
"Node" "Edge" "Face" "Text"
Short Name: vpftype

3.4 Raster Object Information -- the types and numbers of raster spatial objects in the data set.
Type: compound
Short Name: rastinfo

3.4.1 Raster Object Type -- raster spatial objects used to locate zero-, two-, or three-dimensional locations in the data set.
Type: text
Domain: (With the exception of "voxel", the domain is from "Spatial Data Concepts," which is chapter 2 of part 1 *in* Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology):
"Point" "Pixel" "Grid Cell" "Voxel"
Short Name: rasttype

3.4.2 Row Count -- the maximum number of raster objects along the ordinate (y) axis. For use with rectangular raster objects.
Type: Integer
Domain: Row Count > 0
Short Name: rowcount

3.4.3 Column Count -- the maximum number of raster objects along the abscissa (x) axis. For use with rectangular raster objects.
Type: Integer
Domain: Column Count > 0
Short Name: colcount

3.4.4 Vertical Count -- the maximum number of raster objects along the vertical (z) axis. For use with rectangular volumetric raster objects (voxels).
Type: Integer
Domain: Depth Count > 0
Short Name: vrtcount

Spatial Reference Information

4 Spatial Reference Information -- the description of the reference frame for, and the means to encode, coordinates in the data set.

Type: compound
Short Name: spref

```
Spatial_Reference_Information =
        0{Horizontal_Coordinate_System_Definition}1 +
        0{Vertical_Coordinate_System_Definition}1

    Horizontal_Coordinate_System_Definition =
        [Geographic |
            1{Planar}n |
            Local] +
        0{Geodetic_Model}1

        Geographic =
            Latitude_Resolution +
            Longitude_Resolution +
            Geographic_Coordinate_Units

        Planar =
            [Map_Projection |
                Grid_Coordinate_System |
                Local_Planar] +
            Planar_Coordinate_Information

            Map_Projection =
                Map_Projection_Name +
                [Albers_Conical_Equal_Area |
                    Azimuthal_Equidistant |
                    Equidistant_Conic |
                    Equirectangular |
                    General_Vertical_Near-sided_Perspective |
                    Gnomonic |
                    Lambert_Azimuthal_Equal_Area |
                    Lambert_Conformal_Conic |
                    Mercator |
                    Modified_Stereographic_for_Alaska |
                    Miller_Cylindrical |
                    Oblique_Mercator |
                    Orthographic |
                    Polar_Stereographic |
                    Polyconic |
                    Robinson |
                    Sinusoidal |
                    Space_Oblique_Mercator_(Landsat) |
                    Stereographic |
                    Transverse Mercator |
                    van_der_Grinten |
                    Map_Projection_Parameters]
```

Albers_Conical_Equal_Area =
Standard_Parallel (2) +
Longitude_of_Central_Meridian +
Latitude_of_Projection_Origin +
False_Easting +
False_Northing

Azimuthal_Equidistant =
Longitude_of_Central_Meridian +
Latitude_of_Projection_Origin +
False_Easting +
False_Northing

Equidistant_Conic =
Standard_Parallel (2) +
Longitude_of_Central_Meridian +
Latitude_of_Projection_Origin +
False_Easting +
False_Northing

Equirectangular =
Standard_Parallel +
Longitude_of_Central_Meridian +
False_Easting +
False_Northing

General_Vertical_Near-sided_Perspective =
Height_of_Perspective_Point_Above_Surface +
Longitude_of_Projection_Center +
Latitude_of_Projection_Center +
False_Easting +
False_Northing

Gnomonic =
Longitude_of_Projection_Center +
Latitude_of_Projection_Center +
False_Easting +
False_Northing

Lambert_Azimuthal_Equal_Area =
Longitude_of_Projection_Center +
Latitude_of_Projection_Center +
False_Easting +
False_Northing

Lambert_Conformal_Conic =
Standard_Parallel (2) +
Longitude_of_Central_Meridian +
Latitude_of_Projection_Origin +
False_Easting +
False_Northing

Mercator =

```
        [Standard_Parallel |
            Scale_Factor_at_Equator] +
        Longitude_of_Central_Meridian +
        False_Easting +
        False_Northing

Modified_Stereographic_for_Alaska =
        False_Easting +
        False_Northing

Miller_Cylindrical =
        Longitude_of_Central_Meridian +
        False_Easting +
        False_Northing

Oblique_Mercator =
        Scale_Factor_at_Center_Line +
        [Oblique_Line_Azimuth |
            Oblique_Line_Point] +
        Latitude_of_Projection_Origin +
        False_Easting +
        False_Northing

Oblique_Line_Azimuth =
        Azimuthal_Angle +
        Azimuth_Measure_Point_Longitude

Oblique_Line_Point =
        2{Oblique_Line_Latitude +
            Oblique_Line_Longitude}2

Orthographic =
        Longitude_of_Projection_Center +
        Latitude_of_Projection_Center +
        False_Easting +
        False_Northing

Polar_Stereographic =
        Straight-Vertical_Longitude_from_Pole +
        [Standard_Parallel |
            Scale_Factor_at_Projection_Origin] +
        False_Easting +
        False_Northing

Polyconic =
        Longitude_of_Central_Meridian +
        Latitude_of_Projection_Origin +
        False_Easting +
        False_Northing

Robinson =
        Longitude_of_Projection_Center +
        False_Easting +
```

False_Northing

Sinusoidal =
Longitude_of_Central_Meridian +
False_Easting +
False_Northing

Space_Oblique_Mercator_(Landsat) =
Landsat_Number +
Path_Number +
False_Easting +
False_Northing

Stereographic =
Longitude_of_Projection_Center +
Latitude_of_Projection_Center +
False_Easting +
False_Northing

Transverse_Mercator =
Scale_Factor_at_Central_Meridian +
Longitude_of_Central_Meridian +
Latitude_of_Projection_Origin +
False_Easting +
False_Northing

van_der_Grinten =
Longitude_of_Central_Meridian +
False_Easting +
False_Northing

Map_Projection_Parameters =
Appropriate data elements 4.1.2.1.23.1 through 4.1.2.1.23.18 to document the map projection parameters.

Grid_Coordinate_System =
Grid_Coordinate_System_Name +
[Universal_Transverse_Mercator |
Universal_Polar_Stereographic |
State_Plane_Coordinate_System |
ARC_Coordinate_System |
Other_Grid_System's_Definition]

Universal_Transverse_Mercator =
UTM_Zone_Number +
Transverse_Mercator

Universal_Polar_Stereographic =
UPS_Zone_Identifier +
Polar_Stereographic

State_Plane_Coordinate_System =
SPCS_Zone_Identifier +

```
                    [Lambert_Conformal_Conic |
                        Transverse_Mercator |
                        Oblique_Mercator |
                        Polyconic]

                ARC_Coordinate_System =
                    ARC_System_Zone_Identifier +
                    [Equirectangular |
                        Azimuthal_Equidistant]

            Local_Planar =
                    Local_Planar_Description +
                    Local_Planar_Georeference_Information

            Planar_Coordinate_Information =
                    Planar_Coordinate_Encoding_Method +
                    [Coordinate_Representation |
                        Distance_and_Bearing_Representation] +
                    Planar_Distance_Units

                Coordinate_Representation =
                    Abscissa_Resolution +
                    Ordinate_Resolution

                Distance_and_Bearing_Representation =
                    Distance_Resolution +
                    Bearing_Resolution +
                    Bearing_Units +
                    Bearing_Reference_Direction +
                    Bearing_Reference_Meridian

        Local =
                    Local_Description +
                    Local_Georeference_Information

        Geodetic_Model =
                    0{Horizontal_Datum_Name}1 +
                    Ellipsoid_Name +
                    Semi-major_Axis +
                    Denominator_of_Flattening_Ratio

Vertical_Coordinate_System_Definition =
                    0{Altitude_System_Definition}1 +
                    0{Depth_System_Definition}1

        Altitude_System_Definition =
                    Altitude_Datum_Name +
                    1{Altitude_Resolution}n +
                    Altitude_Distance_Units +
                    Altitude_Encoding_Method

        Depth_System_Definition =
                    Depth_Datum_Name +
```

1{Depth_Resolution}n +
Depth_Distance_Units +
Depth_Encoding_Method

4.1 Horizontal Coordinate System Definition -- the reference frame or system from which linear or angular quantities are measured and assigned to the position that a point occupies.
Type: compound
Short Name: horizsys

4.1.1 Geographic -- the quantities of latitude and longitude which define the position of a point on the Earth's surface with respect to a reference spheroid.
Type: compound
Short Name: geograph

4.1.1.1 Latitude Resolution -- the minimum difference between two adjacent latitude values expressed in Geographic Coordinate Units of measure.
Type: real
Domain: Latitude Resolution > 0.0
Short Name: latres

4.1.1.2 Longitude Resolution -- the minimum difference between two adjacent longitude values expressed in Geographic Coordinate Units of measure.
Type: real
Domain: Longitude Resolution > 0.0
Short Name: longres

4.1.1.3 Geographic Coordinate Units -- units of measure used for the latitude and longitude values.
Type: text
Domain: "Decimal degrees" "Decimal minutes" "Decimal seconds" "Degrees and decimal minutes" "Degrees, minutes, and decimal seconds" "Radians" "Grads"
Short Name: geogunit

4.1.2 Planar -- the quantities of distances, or distances and angles, which define the position of a point on a reference plane to which the surface of the Earth has been projected.
Type: compound
Short Name: planar

4.1.2.1 Map Projection -- the systematic representation of all or part of the surface of the Earth on a plane or developable surface.
Type: compound
Short Name: mapproj

4.1.2.1.1 Map Projection Name -- name of the map projection.
Type: text
Domain: "Albers Conical Equal Area" "Azimuthal Equidistant" "Equidistant Conic" "Equirectangular" "General Vertical Near-sided Projection" "Gnomonic" "Lambert Azimuthal Equal Area" "Lambert Conformal Conic" "Mercator" "Modified Stereographic for Alaska" "Miller Cylindrical" "Oblique Mercator" "Orthographic" "Polar Stereographic" "Polyconic" "Robinson" "Sinusoidal" "Space Oblique Mercator" "Stereographic" "Transverse Mercator" "van der Grinten" free

text
Short Name: mapprojn

4.1.2.1.2 Albers Conical Equal Area -- contains parameters for the Albers Conical Equal Area projection.
Type: compound
Short Name: albers

4.1.2.1.3 Azimuthal Equidistant -- contains parameters for the Azimuthal Equidistant projection.
Type: compound
Short Name:azimequi

4.1.2.1.4 Equidistant Conic -- contains parameters for the Equidistant Conic projection.
Type: compound
Short Name: equicon

4.1.2.1.5 Equirectangular -- contains parameters for the Equirectangular projection.
Type: compound
Short Name: equirect

4.1.2.1.6 General Vertical Near-sided Perspective -- contains parameters for the General Vertical Near-sided Perspective projection.
Type: compound
Short Name: gvnsp

4.1.2.1.7 Gnomonic -- contains parameters for the Gnomonic projection.
Type: compound
Short Name: gnomonic

4.1.2.1.8 Lambert Azimuthal Equal Area -- contains parameters for the Lambert Azimuthal Equal Area projection.
Type: compound
Short Name: lamberta

4.1.2.1.9 Lambert Conformal Conic -- contains parameters for the Lambert Conformal Conic projection.
Type: compound
Short Name:lambertc

4.1.2.1.10 Mercator -- contains parameters for the Mercator projection
Type: compound
Short Name: mercator

4.1.2.1.11 Modified Stereographic for Alaska -- contains parameters for the Modified Stereographic for Alaska projection.
Type: compound
Short Name: modsak

4.1.2.1.12 Miller Cylindrical -- contains parameters for the Miller Cylindrical projection.
Type: compound
Short Name: miller

4.1.2.1.13 Oblique Mercator -- contains parameters for the Oblique Mercator projection.

Type: compound
Short Name: obqmerc

4.1.2.1.14 Orthographic -- contains parameters for the Orthographic projection.
Type: compound
Short Name:orthogr

4.1.2.1.15 Polar Stereographic -- contains parameters for the Polar Stereographic projection.
Type: compound
Short Name:polarst

4.1.2.1.16 Polyconic -- contains parameters for the Polyconic projection.
Type: compound
Short Name:polycon

4.1.2.1.17 Robinson -- contains parameters for the Robinson projection.
Type: compound
Short Name: robinson

4.1.2.1.18 Sinusoidal -- contains parameters for the Sinusoidal projection.
Type: compound
Short Name: sinusoid

4.1.2.1.19 Space Oblique Mercator (Landsat) -- contains parameters for the Space Oblique Mercator (Landsat) projection.
Type: compound
Short Name: spaceobq

4.1.2.1.20 Stereographic -- contains parameters for the Stereographic projection.
Type: compound
Short Name: stereo

4.1.2.1.21 Transverse Mercator -- contains parameters for theTransverse mercator projection.
Type: compound
Short Name: transmer

4.1.2.1.22 van der Grinten -- contains parameters for the van der Grinten projection.
Type: compound
Short Name: vdgrin

4.1.2.1.23 Map Projection Parameters -- a complete parameter set of the projection that was used for the data set. The information provided shall include the names of the parameters and values used for the data set that describe the mathematical relationship between the Earth and the plane or developable surface for the projection.
Type: compound

4.1.2.1.23.1 Standard Parallel -- line of constant latitude at which the surface of the Earth and the plane or developable surface intersect.

Type: real
Domain: -90.0 <= Standard Parallel <= 90.0
Short Name: stdparll

4.1.2.1.23.2 Longitude of Central Meridian -- the line of longitude at the center of a map projection generally used as the basis for constructing the projection.
Type: real
Domain: -180.0 <= Longitude of Central Meridian < 180.0
Short Name: longcm

4.1.2.1.23.3 Latitude of Projection Origin -- latitude chosen as the origin of rectangular coordinates for a map projection.
Type: real
Domain: -90.0 <= Latitude of Projection Origin <= 90.0
Short Name: latprjo

4.1.2.1.23.4 False Easting -- the value added to all "x" values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units.
Type: real
Domain: free real
Short Name: feast

4.1.2.1.23.5 False Northing -- the value added to all "y" values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units.
Type: real
Domain: free real
Short Name: fnorth

4.1.2.1.23.6 Scale Factor at Equator -- a multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance along the equator.
Type: real
Domain: Scale Factor at Equator > 0.0
Short Name: sfequat

4.1.2.1.23.7 Height of Perspective Point Above Surface -- height of viewpoint above the Earth, expressed in meters.
Type: real
Domain: Height of Perspective Point Above Surface > 0.0
Short Name: heightpt

4.1.2.1.23.8 Longitude of Projection Center -- longitude of the point of projection for azimuthal projections.
Type: real
Domain: -180.0 <= Longitude of Projection Center < 180.0
Short Name: longpc

4.1.2.1.23.9 Latitude of Projection Center -- latitude of the point of projection for azimuthal projections.

Type: real
Domain: -90.0 <= Latitude of Projection Center <= 90.0
Short Name: latprjc

4.1.2.1.23.10 Scale Factor at Center Line -- a multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance along the center line.
Type: real
Domain: Scale Factor at Center Line > 0.0
Short Name: sfctrlin

4.1.2.1.23.11 Oblique Line Azimuth -- method used to describe the line along which an oblique mercator map projection is centered using the map projection origin and an azimuth.
Type: compound
Short Name: obqlazim

4.1.2.1.23.11.1 Azimuthal Angle -- angle measured clockwise from north, and expressed in degrees.
Type: real
Domain: 0.0 <= Azimuthal Angle < 360.0
Short Name: azimangl

4.1.2.1.23.11.2 Azimuth Measure Point Longitude -- longitude of the map projection origin.
Type: real
Domain: -180.0 <= Azimuth Measure Point Longitude < 180.0
Short Name: azimptl

4.1.2.1.23.12 Oblique Line Point -- method used to describe the line along which an oblique mercator map projection is centered using two points near the limits of the mapped region that define the center line.
Type: compound
Short Name: obqlpt

4.1.2.1.23.12.1 Oblique Line Latitude -- latitude of a point defining the oblique line.
Type: real
Domain: -90.0 <= Oblique Line Latitude <= 90.0
Short Name: obqllat

4.1.2.1.23.12.2 Oblique Line Longitude -- longitude of a point defining the oblique line.
Type: real
Domain: -180.0 <= Oblique Line Longitude < 180.0
Short Name: obqllong

4.1.2.1.23.13 Straight Vertical Longitude from Pole -- longitude to be oriented straight up from the North or South Pole.
Type: real
Domain: -180.0 <= Straight Vertical Longitude from Pole < 180.0
Short Name: svlong

4.1.2.1.23.14 Scale Factor at Projection Origin -- a multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance at the projection origin.
Type: real
Domain: Scale Factor at Projection Origin > 0.0
Short Name: sfprjorg

4.1.2.1.23.15 Landsat Number -- number of the Landsat satellite. *(Note: This data element exists solely to provide a parameter needed to define the space oblique mercator projection. It is not used to identify data originating from a remote sensing vehicle.)*
Type: Integer
Domain: free integer
Short Name: landsat

4.1.2.1.23.16 Path Number -- number of the orbit of the Landsat satellite. *(Note: This data element exists solely to provide a parameter needed to define the space oblique mercator projection. It is not used to identify data originating from a remote sensing vehicle.)*
Type: integer
Domain: 0 < Path Number < 251 for Landsats 1, 2, or 3
0 < Path Number < 233 for Landsats 4 or 5, free integer
Short Name: pathnum

4.1.2.1.23.17 Scale Factor at Central Meridian -- a multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance along the central meridian.
Type: real
Domain: Scale Factor at Central Meridian > 0.0
Short Name: sfctrmer

4.1.2.1.23.18 Other Projection's Definition -- a description of a projection, not defined elsewhere in the standard, that was used for the data set. The information provided shall include the name of the projection, names of parameters and values used for the data set, and the citation of the specification for the algorithms that describe the mathematical relationship between Earth and plane or developable surface for the projection.
Type: text
Domain: free text

4.1.2.2 Grid Coordinate System -- a plane-rectangular coordinate system usually based on, and mathematically adjusted to, a map projection so that geographic positions can be readily transformed to and from plane coordinates.
Type: compound
Short Name gridsys

4.1.2.2.1 Grid Coordinate System Name -- name of the grid coordinate system.
Type: text
Domain: "Universal Transverse Mercator"
"Universal Polar Stereographic" "State Plane Coordinate System 1927"
"State Plane Coordinate System 1983" "ARC Coordinate System"
"other grid system"
Short Name: gridsysn

4.1.2.2.2 Universal Transverse Mercator (UTM) -- a grid system based on the transverse mercator projection, applied between latitudes 84 degrees north and 80 degrees south on the Earth's surface.
Type: compound
Short Name: utm

4.1.2.2.2.1 UTM Zone Number -- identifier for the UTM zone.
Type: integer
Domain: 1 <= UTM Zone Number <= 60 for the northern hemisphere;
-60 <= UTM Zone Number <= -1 for the southern hemisphere
Short Name: utmzone

4.1.2.2.3 Universal Polar Stereographic (UPS) -- a grid system based on the polar stereographic projection, applied to the Earth's polar regions north of 84 degrees north and south of 80 degrees south.
Type: compound
Short Name: ups

4.1.2.2.3.1 UPS Zone Identifier -- identifier for the UPS zone.
Type: text
Domain: "A" "B" "Y" "Z"
Short Name: upszone

4.1.2.2.4 State Plane Coordinate System (SPCS) -- a plane-rectangular coordinate system established for each state in the United States by the National Geodetic Survey.
Type: compound
Short Name: spcs

4.1.2.2.4.1 SPCS Zone Identifier -- identifier for the SPCS zone.
Type: text
Domain: Four-digit numeric codes for the State Plane Coordinate Systems based on the North American Datum of 1927 are found in Department of Commerce, 1986, Representation of geographic point locations for information interchange (Federal Information Processing Standard 70-1): Washington: Department of Commerce, National Institute of Standards and Technology. Codes for the State Plane Coordinate Systems based on the North American Datum of 1983 are found in Department of Commerce, 1989 (January), State Plane Coordinate System of 1983 (National Oceanic and Atmospheric Administration Manual NOS NGS 5): Silver Spring, Maryland, National Oceanic and Atmospheric Administration, National Ocean Service, Coast and Geodetic Survey.
Short Name: spcszone

4.1.2.2.5 ARC Coordinate System -- the Equal Arc-second Coordinate System, a plane-rectangular coordinate system established in Department of Defense, 1990, Military specification ARC Digitized Raster Graphics (ADRG) (MIL-A-89007): Philadelphia, Department of Defense, Defense Printing Service Detachment Office.
Type: compound

Short Name: arcsys

4.1.2.2.5.1 ARC System Zone Identifier -- identifier for the ARC Coordinate System Zone.
Type: integer
Domain: 1 <= ARC System Zone Identifier <= 18
Short Name: arczone

4.1.2.2.6 Other Grid System's Definition -- a complete description of a grid system, not defined elsewhere in this standard, that was used for the data set. The information provided shall include the name of the grid system, the names of the parameters and values used for the data set, and the citation of the specification for the algorithms that describe the mathematical relationship between the Earth and the coordinates of the grid system.
Type: text
Domain: free text
Short Name: othergrd

4.1.2.3 Local Planar -- any right-handed planar coordinate system of which the z-axis coincides with a plumb line through the origin that locally is aligned with the surface of the Earth.
Type: compound
Short Name: localp

4.1.2.3.1 Local Planar Description -- a description of the local planar system.
Type: text
Domain: free text
Short Name: localpd

4.1.2.3.2 Local Planar Georeference Information -- a description of the information provided to register the local planar system to the Earth (e.g. control points, satellite ephemeral data, inertial navigation data).
Type: text
Domain: free text
Short Name: localpgi

4.1.2.4 Planar Coordinate Information -- information about the coordinate system developed on the planar surface.
Type: compound
Short Name: planci

4.1.2.4.1 Planar Coordinate Encoding Method -- the means used to represent horizontal positions.
Type: text
Domain: "coordinate pair" "distance and bearing" "row and column"
Short Name: plance

4.1.2.4.2 Coordinate Representation -- the method of encoding the position of a point by measuring its distance from perpendicular reference axes (the "coordinate pair" and "row and column" methods).
Type: compound
Short Name: coordrep

4.1.2.4.2.1 Abscissa Resolution -- the (nominal) minimum distance between the "x" or column values of two adjacent points, expressed in Planar Distance Units of measure.
Type: real
Domain: Abscissa Resolution > 0.0
Short Name: absres

4.1.2.4.2.2 Ordinate Resolution -- the (nominal) minimum distance between the "y" or row values of two adjacent points, expressed in Planar Distance Units of measure.
Type: real
Domain: Ordinate Resolution > 0.0
Short Name: ordres

4.1.2.4.3 Distance and Bearing Representation -- a method of encoding the position of a point by measuring its distance and direction (azimuth angle) from another point.
Type: compound
Short Name: distbrep

4.1.2.4.3.1 Distance Resolution -- the minimum distance measurable between two points, expressed Planar Distance Units of measure.
Type: real
Domain: Distance Resolution > 0.0
Short Name: distres

4.1.2.4.3.2 Bearing Resolution -- the minimum angle measurable between two points, expressed in Bearing Units of measure.
Type: real
Domain: Bearing Resolution > 0.0
Short Name: bearres

4.1.2.4.3.3 Bearing Units -- units of measure used for angles.
Type: text
Domain: "Decimal degrees" "Decimal minutes" "Decimal seconds" "Degrees and decimal minutes" "Degrees, minutes, and decimal seconds" "Radians" "Grads"
Short Name: bearunit

4.1.2.4.3.4 Bearing Reference Direction -- direction from which the bearing is measured.
Type: text
Domain: "North" "South"
Short Name: bearrefd

4.1.2.4.3.5 Bearing Reference Meridian -- axis from which the bearing is measured.
Type: text
Domain: "Assumed" "Grid" "Magnetic" "Astronomic" "Geodetic"
Short Name: bearrefm

4.1.2.4.4 Planar Distance Units -- units of measure used for distances.
Type: text
Domain: "meters" "international feet" "survey feet" free text

Short Name: plandu

4.1.3 Local -- a description of any coordinate system that is not aligned with the surface of the Earth.
Type: compound
Short Name: local

4.1.3.1 Local Description -- a description of the coordinate system and its orientation to the surface of the Earth.
Type: text
Domain: free text
Short Name: localdes

4.1.3.2 Local Georeference Information -- a description of the information provided to register the local system to the Earth (e.g. control points, satellite ephemeral data, inertial navigation data).
Type: text
Domain: free text
Short Name: localgeo

4.1.4 Geodetic Model -- parameters for the shape of the earth.
Type: compound
Short Name: geodetic

4.1.4.1 Horizontal Datum Name -- the identification given to the reference system used for defining the coordinates of points.
Type: text
Domain: "North American Datum of 1927" "North American Datum of 1983" free text
Short Name: horizdn

4.1.4.2 Ellipsoid Name -- identification given to established representations of the Earth's shape.
Type: text
Domain: "Clarke 1866" "Geodetic Reference System 80" free text
Short Name: ellips

4.1.4.3 Semi-major Axis -- radius of the equatorial axis of the ellipsoid.
Type: real
Domain: Semi-major Axis > 0.0
Short Name: semiaxis

4.1.4.4 Denominator of Flattening Ratio -- the denominator of the ratio of the difference between the equatorial and polar radii of the ellipsoid when the numerator is set to 1.
Type: real
Domain: Denominator of Flattening > 0.0
Short Name: denflat

4.2 Vertical Coordinate System Definition -- the reference frame or system from which vertical distances (altitudes or depths) are measured.
Type: compound
Short Name: vertdef

4.2.1 Altitude System Definition -- the reference frame or system from which altitudes (elevations) are measured. The term "altitude'" is used instead of the common term "elevation" to conform to the terminology in Federal Information Processing Standards 70-1 and 173.
Type: compound
Short Name: altsys

4.2.1.1 Altitude Datum Name -- the identification given to the surface taken as the surface of reference from which altitudes are measured.
Type: text
Domain: "National Geodetic Vertical Datum of 1929" "North American Vertical Datum of 1988" free text
Short Name: altdatum

4.2.1.2 Altitude Resolution -- the minimum distance possible between two adjacent altitude values, expressed in Altitude Distance Units of measure.
Type: real
Domain: Altitude Resolution > 0.0
Short Name: altres

4.2.1.3 Altitude Distance Units -- units in which altitudes are recorded.
Type: text
Domain: "meters" "feet" free text
Short Name: altunits

4.2.1.4 Altitude Encoding Method -- the means used to encode the altitudes.
Type: text
Domain: "Explicit elevation coordinate included with horizontal coordinates" "Implicit coordinate" "Attribute values"
Short Name: altenc

4.2.2 Depth System Definition -- the reference frame or system from which depths are measured.
Type: compound
Short Name: depthsys

4.2.2.1 Depth Datum Name -- the identification given to surface of reference from which depths are measured.
Type: text
Domain: "Local surface" "Chart datum; datum for sounding reduction" "Lowest astronomical tide" "Highest astronomical tide" "Mean low water" "Mean high water" "Mean sea level" "Land survey datum" "Mean low water springs" "Mean high water springs" "Mean low water neap" "Mean high water neap" "Mean lower low water" "Mean lower low water springs" "Mean higher high water" "Mean higher low water" "Mean lower high water" "Spring tide" "Tropic lower low water" "Neap tide" "High water" "Higher high water" "Low water" "Low-water datum" "Lowest low water" "Lower low water" "Lowest normal low water" "Mean tide level" "Indian spring low water" "High-water full and charge" "Low-water full and charge" "Columbia River datum" "Gulf Coast low water datum" "Equatorial springs low water" "Approximate lowest astronomical tide" "No correction" free text
Short Name: depthdn

4.2.2.2 Depth Resolution -- the minimum distance possible between two adjacent depth values, expressed in Depth Distance Units of measure.

Type: real
Domain: Depth Resolution > 0.0
Short Name: depthres

4.2.2.3 Depth Distance Units -- units in which depths are recorded.
Type: text
Domain: "meters" "feet" free text
Short Name: depthdu

4.2.2.4 Depth Encoding Method -- the means used to encode depths.
Type: text
Domain: "Explicit depth coordinate included with horizontal coordinates" "Implicit coordinate" "Attribute values"
Short Name: depthem

Entity and Attribute Information

5 Entity and Attribute Information -- details about the information content of the data set, including the entity types, their attributes, and the domains from which attribute values may be assigned.
Type: compound
Short Name: eainfo

```
Entity_and_Attribute_Information =
                    [1{Detailed_Description}n |
                        1{Overview_Description}n |
                        1{Detailed_Description}n +
                        1{Overview_Description}n]

    Detailed_Description =
                    Entity_Type +
                        0{Attribute}n

        Entity_Type =
                    Entity_Type_Label +
                    Entity_Type_Definition +
                    Entity_Type_Definition_Source

        Attribute =
                    Attribute_Label +
                    Attribute_Definition +
                    Attribute_Definition_Source +
                    1{Attribute_Domain_Values}n +
                    0{Beginning_Date_of_Attribute_Values +
                        0{Ending_Date_of_Attribute_Values}1}n +
                    (Attribute_Value_Accuracy_Information) +
                    (Attribute_Measurement_Frequency)

            Attribute_Domain_Values =
                    [Enumerated_Domain |
                        Range_Domain |
                        Codeset_Domain |
                        Unrepresentable_Domain]

                Enumerated_Domain =
                    1{Enumerated_Domain_Value +
                        Enumerated_Domain_Value_Definition +
                        Enumerated_Domain_Value_Definition_Source +
                        0{Attribute}n }n

                Range_Domain =
                    Range_Domain_Minimum +
                    Range_Domain_Maximum +
                    0{Attribute_Units_of_Measure}1 +
                    (Attribute_Measurement_Resolution) +
                    0{Attribute}n
                Codeset_Domain=
                    Codeset_Name +
                    Codeset_Source
```

Attribute_Value_Accuracy_Information =
Attribute_Value_Accuracy +
Attribute_Value_Accuracy_Explanation

Overview_Description =
Entity_and_Attribute_Overview +
1{Entity_and_Attribute_Detail_Citation}n

5.1 Detailed Description -- description of the entities, attributes, attribute values, and related characteristics encoded in the data set.
Type: compound
Short Name: detailed

5.1.1 Entity Type -- the definition and description of a set into which similar entity instances are classified.
Type: compound
Short Name: enttype

5.1.1.1 Entity Type Label -- the name of the entity type.
Type: text
Domain: free text
Short Name: enttypl

5.1.1.2 Entity Type Definition -- the description of the entity type.
Type: text
Domain: free text
Short Name: enttypd

5.1.1.3 Entity Type Definition Source -- the authority of the definition.
Type: text
Domain: free text
Short Name: enttypds

5.1.2 Attribute -- a defined characteristic of an entity.
Type: compound
Short Name: attr

5.1.2.1 Attribute Label -- the name of the attribute.
Type: text
Domain: free text
Short Name: attrlabl

5.1.2.2 Attribute Definition -- the description of the attribute.
Type: text
Domain: free text
Short Name: attrdef

5.1.2.3 Attribute Definition Source -- the authority of the definition.
Type: text
Domain: free text
Short Name: attrdefs

5.1.2.4 Attribute Domain Values -- the valid values that can be assigned for an attribute.

Type: compound
Short Name: attrdomv

5.1.2.4.1 Enumerated Domain -- the members of an established set of valid values.
Type: compound
Short Name: edom

5.1.2.4.1.1 Enumerated Domain Value -- the name or label of a member of the set.
Type: text
Domain: free text
Short Name: edomv

5.1.2.4.1.2 Enumerated Domain Value Definition -- the description of the value.
Type: text
Domain: free text
Short Name: edomvd

5.1.2.4.1.3 Enumerated Domain Value Definition Source -- the authority of the definition.
Type: text
Domain: free text
Short Name: edomvds

5.1.2.4.2 Range Domain -- the minimum and maximum values of a continuum of valid values.
Type: compound
Short Name: rdom

5.1.2.4.2.1 Range Domain Minimum -- the least value that the attribute can be assigned.
Type: text
Domain: free text
Short Name: rdommin

5.1.2.4.2.2 Range Domain Maximum -- the greatest value that the attribute can be assigned.
Type: text
Domain: free text
Short Name: rdommax

5.1.2.4.3 Codeset Domain -- reference to a standard or list which contains the members of an established set of valid values.
Type: compound
Short Name: codesetd

5.1.2.4.3.1 Codeset Name -- the title of the codeset.
Type: text
Domain: free text
Short Name: codesetn

5.1.2.4.3.2 Codeset Source -- the authority for the codeset.
Type: text
Domain: free text
Short Name: codesets

5.1.2.4.4 Unrepresentable Domain -- description of the values and reasons why they cannot be represented.
Type: text
Domain: free text
Short Name: udom

5.1.2.5 Attribute Units of Measure -- the standard of measurement for an attribute value.
Type: text
Domain: free text
Short Name: attrunit

5.1.2.6 Attribute Measurement Resolution -- the smallest unit increment to which an attribute value is measured.
Type: real
Domain: Attribute Measurement Resolution > 0.0
Short Name: attrmres

5.1.2.7 Beginning Date of Attribute Values -- earliest or only date for which the attribute values are current. In cases when a range of dates are provided, this is the earliest date for which the information is valid.
Type: date
Domain: free date
Short Name: begdatea

5.1.2.8 Ending Date of Attribute Values -- latest date for which the information is current. Used in cases when a range of dates are provided.
Type: date
Domain: free date
Short Name: enddatea

5.1.2.9 Attribute Value Accuracy Information -- an assessment of the accuracy of the assignment of attribute values.
Type: compound
Short Name: attrvai

5.1.2.9.1 Attribute Value Accuracy -- an estimate of the accuracy of the assignment of attribute values.
Type: real
Domain: free real
Short Name: attrva

5.1.2.9.2 Attribute Value Accuracy Explanation -- the definition of the Attribute Value Accuracy measure and units, and a description of how the estimate was derived.
Type: text
Domain: free text
Short Name: attrvae

5.1.2.10 Attribute Measurement Frequency -- the frequency with which attribute values are added.
Type: real
Domain: "Unknown" "As needed" "Irregular" "None planned" free text
Short Name: attrmfrq

5.2 Overview Description -- summary of, and citation to detailed description of, the information content of the data set.
Type: compound
Short Name: overview

5.2.1 Entity and Attribute Overview -- detailed summary of the information contained in a data set.
Type: text
Domain: free text
Short Name: eaover

5.2.2 Entity and Attribute Detail Citation -- reference to the complete description of the entity types, attributes, and attribute values for the data set.
Type: text
Domain: free text
Short Name: eadetcit

Distribution Information

6 Distribution Information -- information about the distributor of and options for obtaining the data set.

Type: compound
Short Name: distinfo

Distribution_Information =
Distributor +
0{Resource_Description}1 +
Distribution_Liability +
0{Standard_Order_Process}n +
0{Custom_Order_Process}1 +
(Technical_Prerequisites) +
(Available_Time_Period)

Distributor =
Contact_Information *(see section 10 for production rules)*

Standard_Order_Process =
[Non-digital_Form |
1{Digital_Form}n] +
Fees +
(Ordering_Instructions) +
(Turnaround)

Digital_Form =
Digital_Transfer_Information +
Digital_Transfer_Option

Digital_Transfer_Information =
Format_Name +
([Format_Version_Number |
Format_Version_Date] +
(Format_Specification)) +
(Format_Information_Content) +
0{File_Decompression_Technique}1 +
(Transfer_Size)

Digital_Transfer_Option =
1{ [Online_Option |
Offline_Option] }n

Online_Option =
1{Computer_Contact_Information}n +
(Access_Instructions) +
(Online_Computer_and_Operating_System)

Computer_Contact_Information =
[Network_Address |
Dialup_Instructions]

Network_Address =

1{Network_Resource_Name}n

Dialup_Instructions =
Lowest_BPS +
0{Highest_BPS}1 +
Number_DataBits +
Number_StopBits +
Parity +
0{Compression_Support}1 +
1{Dialup_Telephone}n +
1{Dialup_File_Name}n

Offline_Option =
Offline_Media +
0{Recording_Capacity}1
1{Recording_Format}n +
0{Compatibility_Information}1

Recording_Capacity =
1{Recording Density}n +
Recording_Density_Units

Available_Time_Period =
Time_Period_Information *(see section 9 for production rules)*

6.1 Distributor -- the party from whom the data set may be obtained.
Type: compound
Short Name: distrib

6.2 Resource Description -- the identifier by which the distributor knows the data set.
Type: text
Domain: free text
Short Name: resdesc

6.3 Distribution Liability -- statement of the liability assumed by the distributor.
Type: text
Domain: free text
Short Name: distliab

6.4 Standard Order Process -- the common ways in which the data set may be obtained or received, and related instructions and fee information.
Type: compound
Short Name: stdorder

6.4.1 Non-digital Form -- the description of options for obtaining the data set on non-computer-compatible media.
Type: text
Domain: free text
Short Name: nondig

6.4.2 Digital Form -- the description of options for obtaining the data set on computer-compatible media.
Type: compound

Short Name: digform

6.4.2.1 Digital Transfer Information - description of the form of the data to be distributed.
Type: compound
Short Name: digtinfo

6.4.2.1.1 Format Name -- the name of the data transfer format.
Type: text
Domain: domain values from the table below; free text
Short Name: formname

Domain Value	Definition
"ARCE"	ARC/INFO Export format
"ARCG"	ARC/INFO Generate format
"ASCII"	ASCII file, formatted for text attributes, declared format
"BIL"	Imagery, band interleaved by line
"BIP"	Imagery, band interleaved by pixel
"BSQ"	Imagery, band interleaved sequential
"CDF"	Common Data Format
"CFF"	Cartographic Feature File (U.S. Forest Service)
"COORD"	User-created coordinate file, declared format
"DEM"	Digital Elevation Model format (U.S. Geological Survey)
"DFAD"	Digital Feature Analysis Data (National Imagery and Mapping Agency)
"DGN"	Microstation format (Intergraph Corporation)
"DIGEST"	Digital Geographic Information Exchange Standard
"DLG"	Digital Line Graph (U.S. Geological Survey)
"DTED"	Digital Terrain Elevation Data (MIL-D-89020)
"DWG"	AutoCAD Drawing format
"DX90"	Data Exchange '90
"DXF"	AutoCAD Drawing Exchange Format
"ERDAS"	ERDAS image files (ERDAS Corporation)
"GRASS"	Geographic Resources Analysis Support System
"HDF"	Hierarchical Data Format
"IGDS"	Interactive Graphic Design System format (Intergraph Corporation)
"IGES"	Initial Graphics Exchange Standard
"MOSS"	Multiple Overlay Statistical System export file
"netCDF"	network Common Data Format
"NITF"	National Imagery Transfer Format
"RPF"	Raster Product Format (National Imagery and Mapping Agency)
"RVC"	Raster Vector Converted format (MicroImages)
"RVF"	Raster Vector Format (MicroImages)
"SDTS"	Spatial Data Transfer Standard (Federal Information Processing Standard 173)
"SIF"	Standard Interchange Format (DOD Project 2851)
"SLF"	Standard Linear Format (National Imagery and Mapping Agency)
"TIFF"	Tagged Image File Format

"TGRLN" Topologically Integrated Geographic Encoding and Referencing (TIGER) Line format (Bureau of the Census)
"VPF" Vector Product Format (National Imagery and Mapping Agency)

6.4.2.1.2 Format Version Number -- version number of the format.
Type: text
Domain: free text
Short Name: formvern

6.4.2.1.3 Format Version Date -- date of the version of the format.
Type: date
Domain: free date
Short Name: formverd

6.4.2.1.4 Format Specification -- name of a subset, profile, or product specification of the format.
Type: text
Domain: free text
Short Name: formspec

6.4.2.1.5 Format Information Content -- description of the content of the data encoded in a format.
Type: text
Domain: free text
Short Name: formcont

6.4.2.1.6 File Decompression Technique -- recommendations of algorithms or processes (including means of obtaining these algorithms or processes) that can be applied to read or expand data sets to which data compression techniques have been applied.
Type: text
Domain: "No compression applied", free text
Short Name: filedec

6.4.2.1.7 Transfer Size -- the size, or estimated size, of the transferred data set in megabytes.
Type: real
Domain: Transfer Size > 0.0
Short Name: transize

6.4.2.2 Digital Transfer Option -- the means and media by which a data set is obtained from the distributor.
Type: compound
Short Name: digtopt

6.4.2.2.1 Online Option -- information required to directly obtain the data set electronically.
Type: compound
Short Name: onlinopt

6.4.2.2.1.1 Computer Contact Information -- instructions for establishing communications with the distribution computer.

Type: compound
Short Name: computer

6.4.2.2.1.1.1 Network Address -- the electronic address from which the data set can be obtained from the distribution computer.
Type: compound
Short Name: networka

6.4.2.2.1.1.1.1 Network Resource Name -- the name of the file or service from which the data set can be obtained.
Type: text
Domain: free text
Short Name: networkr

6.4.2.2.1.1.2 Dialup Instructions -- information required to access the distribution computer remotely through telephone lines.
Type: compound
Short Name: dialinst

6.4.2.2.1.1.2.1 Lowest BPS -- lowest or only speed for the connection's communication, expressed in bits per second.
Type: integer
Domain: Lowest BPS >= 110
Short Name: lowbps

6.4.2.2.1.1.2.2 Highest BPS -- highest speed for the connection's communication, expressed in bits per second. Used in cases when a range of rates are provided.
Type: integer
Domain: Highest BPS > Lowest BPS
Short Name: highbps

6.4.2.2.1.1.2.3 Number DataBits -- number of data bits in each character exchanged in the communication.
Type: integer
Domain: 7 <= Number DataBits <= 8
Short Name: numdata

6.4.2.2.1.1.2.4 Number StopBits -- number of stop bits in each character exchanged in the communication.
Type: integer
Domain: 1 <= Number StopBits <= 2
Short Name: numstop

6.4.2.2.1.1.2.5 Parity -- parity error checking used in each character exchanged in the communication.
Type: text
Domain: "None" "Odd" "Even" "Mark" "Space"
Short Name: parity

6.4.2.2.1.1.2.6 Compression Support -- data compression available through the modem service to speed data transfer.
Type: text

Domain: "V.32" "V.32bis" "V.42" "V.42bis"
free text
Short Name: compress

6.4.2.2.1.1.2.7 Dialup Telephone -- the telephone number of the distribution computer.
Type: text
Domain: free text
Short Name: dialtel

6.4.2.2.1.1.2.8 Dialup File Name -- the name of a file containing the data set on the distribution computer.
Type: text
Domain: free text
Short Name: dialfile

6.4.2.2.1.2 Access Instructions -- instructions on the steps required to access the data set.
Type: text
Domain: free text
Short Name: accinstr

6.4.2.2.1.3 Online Computer and Operating System -- the brand of distribution computer and its operating system.
Type: text
Domain: free text
Short Name: oncomp

6.4.2.2.2 Offline Option -- information about media-specific options for receiving the data set.
Type: compound
Short Name: offoptn

6.4.2.2.2.1 Offline Media -- name of the media on which the data set can be received.
Type: text
Domain: "CD-ROM" "3-1/2 inch floppy disk" "5-1/4 inch floppy disk" "9-track tape" "4 mm cartridge tape" "8 mm cartridge tape" "1/4-inch cartridge tape" free text
Short Name: offmedia

6.4.2.2.2.2 Recording Capacity -- the density of information to which data are written. Used in cases where different recording capacities are possible.
Type: compound
Short Name: reccap

6.4.2.2.2.2.1 Recording Density -- the density in which the data set can be recorded.
Type: real
Domain: Recording Density > 0.0
Short Name: recden

6.4.2.2.2.2.2 Recording Density Units -- the units of measure for the recording density.

Type: text
Domain: free text
Short Name: recdenu

6.4.2.2.2.3 Recording Format -- the options available or method used to write the data set to the medium.
Type: text
Domain: "cpio" "tar" "High Sierra" "ISO 9660" "ISO 9660 with Rock Ridge extensions" "ISO 9660 with Apple HFS extensions" free text
Short Name: recfmt

6.4.2.2.2.4 Compatibility Information --- description of other limitations or requirements for using the medium.
Type: text
Domain: free text
Short Name: compat

6.4.3 Fees -- the fees and terms for retrieving the data set.
Type: text
Domain: free text
Short Name: fees

6.4.4 Ordering Instructions -- general instructions and advice about, and special terms and services provided for, the data set by the distributor.
Type: text
Domain: free text
Short Name: ordering

6.4.5 Turnaround -- typical turnaround time for the filling of an order.
Type: text
Domain: free text
Short Name: turnarnd

6.5 Custom Order Process -- description of custom distribution services available, and the terms and conditions for obtaining these services.
Type: text
Domain: free text
Short Name: custom

6.6 Technical Prerequisites -- description of any technical capabilities that the consumer must have to use the data set in the form(s) provided by the distributor.
Type: text
Domain: free text
Short Name: techpreq

6.7 Available Time Period -- the time period when the data set will be available from the distributor.
Type: compound
Short Name: availabl

Metadata Reference Information

7 Metadata Reference Information -- information on the currentness of the metadata information, and the responsible party.
Type: compound
Short Name: metainfo

Metadata_Reference_Information =
Metadata_Date +
(Metadata_Review_Date) +
(Metadata_Future_Review_Date) +
Metadata_Contact +
Metadata_Standard_Name +
Metadata_Standard_Version +
0{Metadata_Time_Convention}1 +
(Metadata_Access_Constraints) +
(Metadata_Use_Constraints) +
(Metadata_Security_Information) +
0{Metadata_Extensions}n

Metadata_Contact =
Contact_Information *(see section 10 for production rules)*

Metadata_Security_Information =
Metadata_Security_Classification_System +
Metadata_Security_Classification +
Metadata_Security_Handling_Description

Metadata_Extensions =
0{Online_Linkage}n +
0{Profile_Name}1

7.1 Metadata Date -- the date that the metadata were created or last updated.
Type: date
Domain: free date
Short Name: metd

7.2 Metadata Review Date -- the date of the latest review of the metadata entry.
Type: date
Domain: free date; Metadata Review Date later than Metadata Date
Short Name: metrd

7.3 Metadata Future Review Date -- the date by which the metadata entry should be reviewed.
Type: date
Domain: free date; Metadata Future Review Date later than Metadata Review Date
Short Name: metfrd

7.4 Metadata Contact -- the party responsible for the metadata information.
Type: compound
Short Name: metc

7.5 Metadata Standard Name -- the name of the metadata standard used to document the data set.

Type: text
Domain: "FGDC Content Standard for Digital Geospatial Metadata" free text
Short Name: metstdn

7.6 Metadata Standard Version -- identification of the version of the metadata standard used to document the data set.
Type: text
Domain: free text
Short Name: metstdv

7.7 Metadata Time Convention -- form used to convey time of day information in the metadata entry. Used if time of day information is included in the metadata for a data set.
Type: text
Domain: "local time" "local time with time differential factor" "universal time"
Short Name: mettc

7.8 Metadata Access Constraints -- restrictions and legal prerequisites for accessing the metadata. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the metadata.
Type: text
Domain: free text
Short Name: metac

7.9 Metadata Use Constraints -- restrictions and legal prerequisites for using the metadata after access is granted. These include any metadata use constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the metadata.
Type: text
Domain: free text
Short Name: metuc

7.10 Metadata Security Information -- handling restrictions imposed on the metadata because of national security, privacy, or other concerns.
Type: compound
Short Name: metsi

7.10.1 Metadata Security Classification System -- name of the classification system for the metadata.
Type: text
Domain: free text
Short Name: metscs

7.10.2 Metadata Security Classification -- name of the handling restrictions on the metadata.
Type: text
Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified" "Sensitive" free text
Short Name: metsc

7.10.3 Metadata Security Handling Description -- additional information about the restrictions on handling the metadata.
Type: text
Domain: free text
Short Name: metshd

7.11 Metadata Extensions – a reference to extended elements to the standard which may be defined by a

metadata producer or a user community. Extended elements are elements outside the Standard, but needed by the metadata producer. If extended elements are created, they must follow the guidelines in Appendix D, Guidelines for Creating Extended Elements to the Content Standard for Digital Geospatial Metadata.

Type: compound
Short Name: metextns

7.11.1 Online Linkage -- the name of an online computer resource that contains the metadata extension information for the data set. Entries should follow the Uniform Resource Locator convention of the Internet.

Type: text
Domain: free text
Short Name: onlink

7.11.2 Profile Name -- the name given to a document that describes the application of the Standard to a specific user community.

Type: text
Domain: free text
Short Name: metprof

Citation Information

8 Citation Information -- the recommended reference to be used for the data set. *(Note: this section provides a means of stating the citation of a data set, and is used by other sections of the metadata standard. This section is never used alone.)*

Type: compound
Short Name: citeinfo

Citation_Information =
1{Originator}n +
Publication_Date +
(Publication_Time) +
Title +
0{Edition}1 +
0{Geospatial_Data_Presentation_Form}1 +
0{Series_Information}1 +
0{Publication_Information}1 +
0{Other_Citation_Details}1 +
(1{Online_Linkage}n) +
0{Larger_Work_Citation}1

Series_Information =
Series_Name +
Issue_Identification

Publication_Information =
Publication_Place +
Publisher

Larger_Work_Citation =
Citation_Information

8.1 Originator -- the name of an organization or individual that developed the data set. If the name of editors or compilers are provided, the name must be followed by "(ed.)" or "(comp.)" respectively.

Type: text
Domain: "Unknown" free text
Short Name: origin

8.2 Publication Date -- the date when the data set is published or otherwise made available for release.

Type: date
Domain: "Unknown" "Unpublished material" free date
Short Name: pubdate

8.3 Publication Time -- the time of day when the data set is published or otherwise made available for release.

Type: time
Domain: "Unknown" free time
Short Name: pubtime

8.4 Title -- the name by which the data set is known.

Type: text
Domain: free text
Short Name: title

8.5 Edition -- the version of the title.
Type: text
Domain: free text
Short Name: edition

8.6 Geospatial Data Presentation Form -- the mode in which the geospatial data are represented.
Type: text
Domain: (the listed domain is partially from pp. 88-91 *in* Anglo-American Committee on Cataloguing of Cartographic Materials, 1982, Cartographic materials: A manual of interpretation for AACR2: Chicago, American Library Association):
"atlas" “audio” "diagram" “document” "globe" "map" "model" “multimedia presentation” "profile" “raster digital data” "remote-sensing image" "section" “spreadsheet” “tabular digital data” “vector digital data” “video” "view" free text
Short Name: geoform

8.7 Series Information -- the identification of the series publication of which the data set is a part.
Type: compound
Short Name: serinfo

8.7.1 Series Name -- the name of the series publication of which the data set is a part.
Type: text
Domain: free text
Short Name: sername

8.7.2 Issue Identification -- information identifying the issue of the series publication of which the data set is a part.
Type: text
Domain: free text
Short Name: issue

8.8 Publication Information -- publication details for published data sets.
Type: compound
Short Name: pubinfo

8.8.1 Publication Place -- the name of the city (and state or province, and country, if needed to identify the city) where the data set was published or released.
Type: text
Domain: free text
Short Name: pubplace

8.8.2 Publisher -- the name of the individual or organization that published the data set.
Type: text
Domain: free text
Short Name: publish

8.9 Other Citation Details -- other information required to complete the citation.
Type: text
Domain: free text
Short Name: othercit

8.10 Online Linkage -- the name of an online computer resource that contains the data set. Entries should follow the Uniform Resource Locator convention of the Internet.

Type: text
Domain: free text
Short Name: onlink

8.11 Larger Work Citation -- the information identifying a larger work in which the data set is included.
Type: compound
Short Name: lworkcit

Time Period Information

9 Time Period Information -- information about the date and time of an event. *(Note: this section provides a means of stating temporal information, and is used by other sections of the metadata standard. This section is never used alone.)*

Type: compound
Short Name: timeinfo

Time_Period_Information =
[Single_Date/Time |
Multiple_Dates/Times |
Range_of_Dates/Times]

Single_Date/Time =
Calendar_Date +
(Time_of_Day)

Multiple_Dates/Times =
2{Single_Date/Time}n

Range_of_Dates/Times =
Beginning_Date +
(Beginning_Time) +
Ending_Date +
(Ending_Time)

9.1 Single Date/Time -- means of encoding a single date and time.

Type: compound
Short Name: sngdate

9.1.1 Calendar Date -- the year (and optionally month, or month and day).

Type: date
Domain: "Unknown" free date
Short Name: caldate

9.1.2 Time of Day -- the hour (and optionally minute, or minute and second) of the day.

Type: time
Domain: "Unknown" free time
Short Name: time

9.2 Multiple Dates/Times -- means of encoding multiple individual dates and times.

Type: compound
Short Name: mdattim

9.3 Range of Dates/Times -- means of encoding a range of dates and times.

Type: compound
Short Name: rngdates

9.3.1 Beginning Date -- the first year (and optionally month, or month and day) of the event.

Type: date
Domain: "Unknown" free date
Short Name: begdate

9.3.2 Beginning Time -- the first hour (and optionally minute, or minute and second) of the day for the event.

Type: time
Domain: "Unknown" free time
Short Name: begtime

9.3.3 Ending Date -- the last year (and optionally month, or month and day) for the event.

Type: date
Domain: "Unknown" "Present" free date
Short Name: enddate

9.3.4 Ending Time -- the last hour (and optionally minute, or minute and second) of the day for the event.

Type: time
Domain: "Unknown" free time
Short Name: endtime

Contact Information

10 Contact Information -- Identity of, and means to communicate with, person(s) and organization(s) associated with the data set. *(Note: this section provides a means of identifying individuals and organizations, and is used by other sections of the metadata standard. This section is never used alone.)*

Type: compound
Short Name: cntinfo

Contact_Information =
[Contact_Person_Primary |
Contact_Organization_Primary] +
(Contact_Position) +
1{Contact_Address}n +
1{Contact_Voice_Telephone}n +
(1{Contact_TDD/TTY_Telephone}n) +
(1{Contact_Facsimile_Telephone}n) +
(1{Contact_Electronic_Mail_Address}n) +
(Hours_of_Service) +
(Contact_Instructions)

Contact_Person_Primary =
Contact_Person +
(Contact_Organization)

Contact_Organization_Primary =
Contact_Organization +
(Contact_Person)

Contact_Address =
Address_Type +
0{Address}n +
City +
State_or_Province +
Postal_Code +
(Country)

10.1 Contact Person Primary -- the person, and the affiliation of the person, associated with the data set. Used in cases where the association of the person to the data set is more significant than the association of the organization to the data set.

Type: compound
Short Name: cntperp

10.1.1 Contact Person -- the name of the individual to which the contact type applies.

Type: text
Domain: free text
Short Name: cntper

10.1.2 Contact Organization -- the name of the organization to which the contact type applies.

Type: text
Domain: free text
Short Name: cntorg

10.2 Contact Organization Primary -- the organization, and the member of the organization, associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.
Type: compound
Short Name: cntorgp

10.3 Contact Position -- the title of individual.
Type: text
Domain: free text
Short Name: cntpos

10.4 Contact Address -- the address for the organization or individual.
Type: compound
Short Name: cntaddr

10.4.1 Address Type -- the information provided by the address.
Type: text
Domain: "mailing" "physical" "mailing and physical", free text
Short Name: addrtype

10.4.2 Address -- an address line for the address.
Type: text
Domain: free text
Short Name: address

10.4.3 City -- the city of the address.
Type: text
Domain: free text
Short Name: city

10.4.4 State or Province -- the state or province of the address.
Type: text
Domain: free text
Short Name: state

10.4.5 Postal Code -- the ZIP or other postal code of the address.
Type: text
Domain: free text
Short Name: postal

10.4.6 Country -- the country of the address.
Type: text
Domain: free text
Short Name: country

10.5 Contact Voice Telephone -- the telephone number by which individuals can speak to the organization or individual.
Type: text
Domain: free text
Short Name: cntvoice

10.6 Contact TDD/TTY Telephone -- the telephone number by which hearing-impaired individuals can contact the organization or individual.

Type: text
Domain: free text
Short Name: cnttdd

10.7 Contact Facsimile Telephone -- the telephone number of a facsimile machine of the organization or individual.
Type: text
Domain: free text
Short Name: cntfax

10.8 Contact Electronic Mail Address -- the address of the electronic mailbox of the organization or individual.
Type: text
Domain: free text
Short Name: cntemail

10.9 Hours of Service -- time period when individuals can speak to the organization or individual.
Type: text
Domain: free text
Short Name: hours

10.10 Contact Instructions -- supplemental instructions on how or when to contact the individual or organization.
Type: text
Domain: free text
Short Name: cntinst

Appendix A
Glossary

[Most of the terms and definitions are from Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington: Department of Commerce, National Institute of Standards and Technology.]

abscissa -- the coordinate of a point in a plane Cartesian coordinate system obtained by measuring parallel to the x-axis ("the 'x' value").

accuracy -- the closeness of results of observations, computations or estimates to the true values or the values accepted as being true.

altitude -- elevation above or below a reference datum, as defined in Federal Information Processing Standard 70-1. See also elevation.

area -- a generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary.

area chain -- a chain that explicitly references left and right polygons and not start and end nodes. It is a component of a two-dimensional manifold.

area point -- a representative point within an area usually carrying attribute information about that area.

arc -- a locus of points that forms a curve that is defined by a mathematical expression.

attribute -- a defined characteristic of an entity type (e.g. composition).

attribute value -- a specific quality or quantity assigned to an attribute (e.g., steel), for a specific entity instance.

cardinality --the number of elements in an extended compound element

chain -- a directed nonbranching sequence of nonintersecting line segments and (or) arcs bounded by nodes, not necessarily distinct, at each end. Area chain, complete chain, and network chain are special cases of chain, and share all characteristics of the general case as defined above.

child -- the name of the data element which may occur under this data element. A child element may be an extended or a standard element.

clearinghouse -- see National Geospatial Data Clearinghouse.

complete chain -- a chain that explicitly references left and right polygons and start and end nodes. It is a component of a two-dimensional manifold.

compound element -- a group of data elements and other compound elements. Compound elements represent higher-level concepts that cannot be represented by individual data elements.
coordinates -- pairs of numbers expressing horizontal distances along orthogonal axes; alternatively, triplets of numbers measuring horizontal and vertical distances.

data element -- a logically primitive item of data.

data set -- a collection of related data.

depth -- perpendicular distance of an interior point from the surface of an object.

developable surface -- a surface that can be flattened to form a plane without compressing or stretching any part of it. Examples include cones and cylinders.

digital image -- a two-dimensional array of regularly spaced picture elements (pixels) constituting a picture.

digital volume -- a three-dimensional array of regularly spaced volume elements (voxels) constituting a volume.

domain -- in the definition of the elements in the metadata standard, the domain identifies valid values for a data element.

Edge, Topology Level 0 -- VPF term for a string.

Edge, Topology Level 1 -- VPF term for a network chain in a network (in SDTS, a "Network chain, non-planar graph").

Edge, Topology Level 2 -- VPF term for a network chain in a planar graph (in SDTS, a "Network chain, planar graph").

Edge, Topology Level 3 -- VPF term for a complete chain.

elevation -- conforming to Federal Information Processing Standard 70-1, the term "altitude" is used in this standard, rather than the common term elevation.

entity instance -- a spatial phenomenon of a defined type that is embedded in one or more phenomena of different type, or that has at least one key attribute value different from the corresponding attribute values of surrounding phenomena (e.g., the 10 Street Bridge).

entity point -- a point used for identifying the location of point features (or areal features collapsed to a point), such as towers, buoys, buildings, places, etc.

entity type -- the definition and description of a set into which similar entity instances are classified (e.g., bridge).

explicit -- method of identifying positions directly by pairs (for horizontal positions) or triplets (for horizontal and vertical positions) of numbers.

extended element -- a user-defined metadata element included in a metadata collection. Extended elements may be defined by a data set producer or a user community. Extended elements are elements outside the Standard, but needed by the data set producer. If extended elements are created, they must follow the guidelines in Appendix D, Guidelines for Creating Extended Elements in the Content Standard for Digital Geospatial Metadata.

Face, Topology Level 3 -- VPF term for a GT-polygon composed of rings.

G-polygon -- an area consisting of an interior area, one outer G-ring and zero or more nonintersecting,

nonnested inner G-rings. No ring, inner or outer, shall be collinear with or intersect any other ring of the same G-polygon.

G-ring --a string composed of pairs of longitude and latitude coordinates that define a closed non-intersecting boundary.

G-ring point -- a scalar consisting of a set of ordered pairs of floating-point numbers, separated by commas, in which the first number in each pair is the longitude of a point and the second is the latitude of the point. Longitude and latitude are specified in decimal degrees with north latitudes positive and south negative, east longitude positive and west negative.

geospatial data -- information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies.

graph -- a set of topologically interrelated zero-dimensional (node), one-dimensional (link or chain), and sometimes two-dimensional (GT-polygon) objects that conform to a set of defined constraint rules. Numerous rule sets can be used to distinguish different types of graphs. Three such types, planar graph, network, and two-dimensional manifold, are used in this standard. All three share the following rules: each link or chain is bounded by an ordered pair of nodes, not necessarily distinct; a node may bound one or more links or chains; and links or chains may only intersect at nodes. Planar graphs and networks are two specialized types of graphs, and a two-dimensional manifold is an even more specific type of planar graph.

grid -- (1) a set of grid cells forming a regular, or nearly regular, tessellation of a surface; (2) a set of points arrayed in a pattern that forms a regular, or nearly regular, tessellation of a surface. The tessellation is regular if formed by repeating the pattern of a regular polygon, such as a square, equilateral triangle, or regular hexagon. The tessellation is nearly regular if formed by repeating the pattern of an "almost" regular polygon such as a rectangle, non-square parallelogram, or non-equilateral triangle.

grid cell -- a two-dimensional object that represents the smallest nondivisible element of a grid.

GT-polygon -- an area that is an atomic two-dimensional component of one and only one two-dimensional manifold. The boundary of a GT-polygon may be defined by GT-rings created from its bounding chains. A GT-polygon may also be associated with its chains (either the bounding set, or the complete set) by direct reference to these chains. The complete set of chains associated with a GT-polygon may also be found by examining the polygon references on the chains.

GT-ring -- a ring created from complete and (or) area chains.

horizontal -- tangent to the geoid or parallel to a plane that is tangent to the geoid.

implicit -- method of identifying positions by a place in an array of values.

interior area -- an area not including its boundary.

label point -- a reference point used for displaying map and chart text (e.g., feature names) to assist in feature identification.

latitude -- angular distance measured on a meridian north or south from the equator.

layer -- an integrated, areally distributed, set of spatial data usually representing entity instances within one theme, or having one common attribute or attribute value in an association of spatial objects. In the context

of raster data, a layer is specifically a two-dimensional array of scalar values associated with all of part of a grid or image.

line -- a generic term for a one-dimensional object.

line segment -- a direct line between two points.

link -- a topological connection between two nodes. A link may be directed by ordering its nodes.

longitude -- angular distance between the plane of a meridian east or west from the plane of the meridian of Greenwich.

map -- a spatial representation, usually graphic on a flat surface, of spatial phenomena.
media -- the physical devices used to record, store, and (or) transmit data.

meridian -- a great circle on the Earth that passes through the geographic poles.

metadata -- data about the content, quality, condition, and other characteristics of data.

name -- the name of an extended element. The extended element name must not be the name of any other element in the Standard.

National Geospatial Data Clearinghouse -- a distributed network of geospatial data producers, managers, and users linked electronically. Building on initiatives such as the national information infrastructure, the clearinghouse uses a distributed, electronically connected network, such as the Internet. Each data provider will describe available data in an electronic form, and provide these descriptions (or "metadata") using means that can be accessed over a communications network. Thus, the data for the clearinghouse are located at the sites of data producers (or, where more efficient, at the sites of intermediaries) throughout the country. Using the network, users will search these descriptions to locate data that are suitable for their applications.

network -- a graph without two dimensional objects. If projected onto a two-dimensional surface, a network can have either more than one node at a point and (or) intersecting links or chains without corresponding nodes.

network chain -- a chain that explicitly references start and end nodes and not left and right polygons. It is a component of a network.

node -- a zero-dimensional object that is a topological junction of two or more links or chains, or an end point of a link or chain.

Node, Topology Level 0 -- VPF term for a point (in SDTS, a "point").

Node, Topology Level 1 -- VPF term for a node on a network (in SDTS, a "node, network").

Node, Topology Level 2 -- VPF term for a node on a planar graph (in SDTS, a "node, planar graph").

Node, Topology Level 3 -- VPF term for a point used to represent isolated features. These are topologically linked to a containing face.

object -- a digital representation of all or part of an entity instance.

optionality - The optionality of a section or compound element always takes precedence over the elements that it contains. Once a section or compound element is recognized by the data set producer as applicable, then the optionality of its subordinate elements is to be interpreted. See Production Rules section for additional interpretive guidance.

ordinate -- the coordinate of a point in a plane cartesian coordinate system obtained by measuring parallel to the y-axis ("the 'y' value").

parent -- the name of the data element under which a given data element may occur. A parent element may be an extended or a standard element.

phenomenon -- a fact, occurrence or circumstance. Route 10, George Washington National Forest, and Chesterfield County are all phenomena.

pixel -- two-dimensional picture element that is the smallest nondivisible element of a digital image.

planar graph -- the node and link or chain objects of the graph occur or can be represented as though they occur upon a planar surface. Not more than one node may exist at any given point on the surface. Links or chains may only intersect at nodes.

point -- a zero-dimensional object that specifies geometric location. One coordinate pair or triplet specifies the location. Area point, entity point, and label point are special implementations of the general case.

primitive -- the quality of not being subdivided; atomic.

quality -- an essential or distinguishing characteristic necessary for cartographic data to be fit for use.

raster -- one or more overlapping layers for the same grid or digital image.

raster object - one or more images and/or grids, each grid or image representing a layer, such that corresponding grid cells and/or pixels between layers are congruent and registered.

rationale - a component of an extended element. The rationale is provided by the user creating the extended element to explain the reason for its creation and its expected uses.
repeatability --whether or not an extended element can be repeated and optionally a minimum or maximum number of occurrences or both

resolution-- the minimum difference between two independently measured or computed values which can be di stinguished by the measurement or analytical method being considered or used.

ring -- sequence of nonintersecting chains or strings and (or) arcs, with closure. A ring represents a closed boundary, but not the interior area inside the closed boundary.

SDTS -- the Spatial Data Transfer Standard defined by Department of Commerce, 1992, Spatial Data Transfer Standard (SDTS) (Federal Information Processing Standard 173): Washington, Department of Commerce, National Institute of Standards and Technology.

short name -- a unique name for each compound or primitive data element consisting of eight alphabetic characters or less. When creating extended element short names, do not duplicate an existing standard element short name.

source --a component of an extended element. the name of the individual or organization creating an

extended element

spatial data -- see geospatial data.

stratum -- one of a series of layers, levels, or gradations in an ordered system. For this standard, the term is used in the sense of (1) a region of sea, atmosphere, or geology that is distinguished by natural or arbitrary limits; (2) a socioeconomic level of society comprised of persons of the same or similar status, especially with regard to education or culture; or (3) a layer of vegetation, usually of the same or similar height.

string -- a connected non-branching sequence of line segments specified as the ordered sequence of points between those line segments. Note: A string may intersect itself or other strings.

two-dimensional manifold -- a planar graph and its associated two dimensional objects. Each chain bounds two and only two, not necessarily distinct, GT-polygons. The GT-polygons are mutually exclusive and completely exhaust the surface.

type -- in the definition of the elements in the metadata standard, a compound element has the type "compound" to provide a unique way to identify compound elements. For a data element, the type identifies the kind of value that can be assigned to the data element. The choices are "integer" for integer numbers, "real" for real numbers, "text" for ASCII characters, "date" for day of the year, and "time" for time of the day.

universe polygon -- defines the part of the universe that is outside the perimeter of the area covered by other GT-polygons ("covered area") and completes the two-dimensional manifold. This polygon completes the adjacency relationships of the perimeter links. The boundary of the universe polygon is represented by one or more inner rings and no outer ring. Attribution of the universe polygon may not exist, or may be substantially different from the attribution of the covered area.

vector -- composed of directed lines.
vertical -- at right angles to the horizontal; includes altitude and depth.

VPF -- the Vector Product Format defined by Department of Defense, 1992, Vector Product Format (MIL-STD-600006): Philadelphia, Department of Defense, Defense Printing Service Detachment Office.

void polygon -- defines a part of the two-dimensional manifold that is bounded by other GT-polygons, but otherwise has the same characteristics as the universe polygon. The geometry and topology of a void polygon are those of a GT-polygon. Attribution of a void polygon may not exist, or may be substantially different from the attribution of the covered area.
voxel -- a three-dimensional element that is the smallest nondivisible element of a digital volume.

Appendix B
Alphabetical List of Compound Elements and Data Elements

Appendix C
References

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Appendix D
Guidelines for Creating Extended Elements in the Content Standard for Digital Geospatial Metadata

Extended elements to the Standard may be defined by a data set producer or a user community. Extended elements are elements outside the Standard, but needed by the data set producer. If extended elements are created, they must follow the guidelines presented here. The Online_Linkage data element within Metadata_Extensions points to a formal document containing the necessary documentation for a subsequent metadata producer to reuse the extended element. If extended elements are used in a profile, the Profile_Name can also be included in the Metadata_Extensions compound data element. See Appendix E for Guidelines on Creating a Profile for the Content Standard for Digital Geospatial Metadata.

It should be noted here that metadata capture and exploitation tools need to be updated to adjust to these minor modifications. At the end of Section 7, Metadata Reference Information, the following elements were added in order to handle extended elements:

Extended elements may also be created for use with non-geospatial data holdings when this practice does not conflict with other Federal standards, directives, or statutes.

Metadata_Extensions=
0{Online_Linkage}n +
0{Profile_Name}1

If a metadata producer does not have the capability to provide online linkage, he or she may list the information in the data set.

The Online Linkage element references a structured file (or uniform resource locator) containing the following information about the extended element in the production rule dictated below: name, data type, domain values, short name, parent element, optionality (Mandatory, Mandatory-if-applicable, or Optional), cardinality, for example, (0, 1, ..., n) or (> 1 but < 10), repeatability, definition, rationale, and source. The compound element Extension_Information is repeatable, but the primitive data elements occurring in Extension_Information are not. Note that these elements do not appear in the metadata record itself.

Extension_Information =
Name +
Short_Name +
Type +
[Domain | [0{Child}n | Rule]] +
1{Parent}n +
(Optionality) +
(Repeatability) +
(Definition) +
(Rationale) +
(Source)

The following rules must be followed when defining extended elements:

- Extended elements must be formally documented within the hierarchical structure of the Standard (Section 0 - “Metadata”). When metadata extended elements are used, their existence must be documented in the Metadata Reference Information, element Metadata_Extensions. Every effort should be made to logically organize extended elements within the existing sections and structure. Where there is no logical or natural “fit”, new

section(s) and/or subsections may be defined.

- Extended elements must not be used to change the name, definition, type, or domain of a standard element. In particular, an extended element cannot be nested under a data element.

- Extended elements may be defined as compound and may include extended and standard elements as components. If a standard element is included in an extended compound element, no components of the standard element are changed.

- Extended elements, like the standard element "Single_Date/Time" may appear in multiple places in the metadata set.

Extended_Element_Name -- (Mandatory) -- the name of the element. The name given to the element must not be the name of any other element in the Standard.
Domain: free text (Do not duplicate any other Standard element name.)

Definition -- (Mandatory) -- the definition of the element.
Domain: free text

Rationale -- (Optional) -- the reason for creating the Extended element, and its expected uses.
Domain: free text

Source -- (Mandatory) -- the name of the entity creating the Extended element.
Domain: free text

Type -- (Mandatory) -- the kind of value to be provided, or "compound" if the Extended element contains other elements.
Domain: integer, real, text, date, time, compound

Domain -- (Mandatory) -- valid values that can be assigned to the data element. The same rules as those for Standard elements are applied here.
Domain: free text

Short Name -- (Mandatory) -- a unique short name consisting of eight alphabetic characters or less.
Domain: free text (Do not duplicate another short name used by the Standard or any other short name in the Extension Registry.)

Parent -- (Mandatory) -- The name of the element(s) under which this element may appear. The name(s) may be standard or other extended element(s).
Domain: none, free text (Must be the name of an existing standard or extended element. If the extended element is not part of any other compound element, its parent is the section name as defined by the Standard. If the extended element is defining a whole new section, then its parent is Section 0 - "Metadata".)

Child -- (Mandatory-if-applicable) -- The name of the element(s) which may appear under this element. The name(s) may be standard or other extended element(s).
Domain: none, free text (Must be the name of an existing Standard or extended element.)

Rule: production rule for the element, specified using the form given in this Standard.

Appendix E
Guidelines for Creating a Profile for the Content Standard for Digital Geospatial Metadata

The current Content Standard for Digital Geospatial Metadata provides metadata collectors with formally defined elements known as standard elements. The metadata Standard attempts to standardize the content of metadata elements for a wide range of digital geospatial data. However, some users may determine that modifications to the Standard are needed to create meaningful metadata for their data sets. The Standard allows the user to create extended elements and profiles. Extended elements are user-defined elements outside the Standard needed by the metadata producer. A profile is a document that describes the application of the Standard to a specific user community.

A profile always contains the Standard, plus modifications to the optionality or repeatability of non-mandatory elements in the Standard. Modifications to the domains of standard elements can also be made where permitted by the Standard. Profiles may also contain extended elements.

Profiles may be formalized through the FGDC standards process or may be used informally by a user community. FGDC is the approval authority for profiles. To become recognized by the FGDC, a metadata profile must go through the FGDC standards review and approval process. FGDC approved profiles must specify a maintenance authority. While the FGDC is the designated maintenance authority for the Metadata Standard the organization or agency sponsoring a profile will be considered the maintenance authority for that profile.

Profiles may also be created for use with non-geospatial data holdings when this practice does not conflict with other Federal standards, directives, or statutes.

Requirements

A profile must include:

- the basic, minimum set of metadata collected to the specification of this Standard
- all mandatory elements in all mandatory sections. These are known as the core metadata elements
- all mandatory- if-applicable elements in all mandatory sections, if the data set has the characteristic documented in the element
- all mandatory elements in all mandatory-if-applicable sections if the data set has the characteristic documented in the section
- all mandatory-if-applicable elements in all mandatory-if-applicable sections, if the data set has the characteristic documented in the section

Guidelines

The guidelines for creating a profile follow:

- A profile must not change the name, definition, or data type of a standard element.
- A profile may impose more stringent conditionality on standard elements than the Standard requires. (Elements that are optional in the Standard may be mandatory in a profile.)
- A profile may contain elements with domains that are more restrictive than the Standard. (Elements

whose domains have free text in the Standard may have a closed list of appropriate values in the profile.)

- A profile may restrict the use of domain values allowed by the Standard. For example, if the Standard contains five domain values for a standard element, the profile may specify that its domain consist of three domain values identified in the profile. The profile may require that the user select a value from the three domain values.)

- A profile will not permit anything not allowed by the Standard. (If the Standard element has a domain of three values, without a free text element, the profile will not allow a user to enter anything other than those 3 values.)

- Before creating a profile, the metadata producer will check existing registered profiles.

- A profile must be made available to anyone receiving metadata that was collected according to that profile.

- The profile document submitted to the FGDC for formal approval shall contain the same six sections as the introduction section of this Standard.

  The format of a profile document shall meet the directives of the FGDC Standards Working Group and shall consist of the following:

  1. Objectives
  2. Scope
  3. Applicability
  4. Related Standards
  5. Standards Development Process
  6. Maintenance Authority
  7. A section stating that the mandatory elements from the Standard must be provided.
  8. A section describing the changes to the domains and conditionality of Standard elements being modified from their original use in the Standard. These changes should be presented in the same manner used by the Standard.
  9. A section describing the extended elements created under this profile. This section must include all of the components of an extended element described in the Standard.